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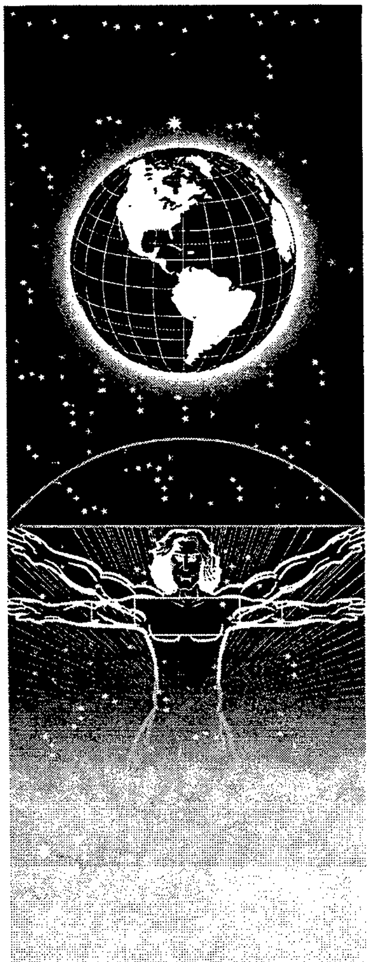

UNITED STATES AIR FORCE RESEARCH LABORATORY

Mitigating the Effects of Military Aircraft Overflights on Recreational Users of Parks

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Final Report for the Period December 1995 to July 1999

Approved for public release; distribution is unlimited.

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This technical report has been reviewed and is approved for publication.

FOR THE COMMANDER

MARIS M. VIKMANIS
Chief, Crew System Interface Division
Air Force Research Laboratory

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This study was initiated as part of the cooperative US Air Force/National Park Service efforts to understand and effectively manage the potential adverse effects military air crew training can have on the National Parks. Through simultaneous sound data acquisition and Park user interviews, data were collected that provided a basis for determining how military jet overflights can affect visitor experience at a site in White Sands National Monument, New Mexico. Several useful findings resulted from the analysis. First, visitors can distinguish between the concepts of "annoyance" and "interference" produced by aircraft sound. Annoyance is an emotional reaction, while interference is more of an objective judgment. Visitors can find that the sound of aircraft interferes with the natural soundscape, but are not necessarily annoyed. Visitors believe annoyance results if the interference is often or severe enough. Second, visitors tend to be less annoyed by aircraft noise if they remember learning that they could hear or see aircraft while in the Park. This finding shows the importance of informing visitors about possible aircraft overflights - i.e., managing visitor expectations. Finally, aircraft noise is likely to produce less annoyance if aircraft fly over in close succession, rather than widely spaced, one at a time.

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This study is a result of a cooperative effort between the US Air Force and the National Park Service to find ways for increasing the compatibility of airspace and public land uses. Both agencies recognize the importance of the other's mandates and responsibilities, and are working to minimize or eliminate conflicts when they occur. By pursuing this study, the two agencies have acknowledged both the potential for adverse effects military air crew training can have on National Parks and the necessity for conducting such training. This study is a scientific search for better understanding of how National Park visitors react to military jet overflights, and for management actions that can be taken to lessen any adverse reactions visitors may have.

The idea and incentive for the study came from both the Air Force and the National Park Service. Col. Fred Pease of the Air Force (XOOA) and Dr. Wesley Henry of NPS (WASO) developed the concepts and supported the study. With their initiative, Dr. Bartholomew Elias and Robert Lee at Wright-Patterson AFB, provided the contract and the guidance to insure the study became a reality.

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1. EXECUTIVE SUMMARY

This study was initiated as part of the cooperative US Air Force / National Park Service efforts to understand and effectively manage the potential adverse effects military air crew training can have on the National Parks. Through simultaneous sound data acquisition and Park user interviews, data were collected that provided a basis for determining how military jet overflights can affect visitor experience at a site in White Sands National Monument, New Mexico. Several useful findings resulted from the analysis. First, visitors can distinguish between the concepts of "annoyance" and "interference" produced by aircraft sound. Annoyance is an emotional reaction, while interference is more of an objective judgement. Visitors can find that the sound of aircraft interferes with the natural soundscape, but are not necessarily annoyed. Visitors believe annoyance results if the interference is often or severe enough. Second, visitors tend to be less annoyed by aircraft noise if they remember learning that they could hear or see aircraft while in the Park. This finding shows the importance of informing visitors about possible aircraft overflights - i.e., managing visitor expectations. Finally, aircraft noise is likely to produce less annoyance if aircraft fly over in close succession, rather than widely spaced, one at a time.

The overall study is summarized briefly on this page, and the following pages summarize each step of the method and the primary results.

OVERALL STUDY: MITIGATING THE EFFECTS OF MILITARY AIRCRAFT ON RECREATIONAL USERS OF PARKS

GOAL: Determine whether there are there any USAF or NPS management actions that could significantly reduce adverse effects of military aircraft on park visitors.

OBJECTIVES: Examine three management actions for effects on visitor reactions -

1. Providing visitors with information about overflights,
2. Altering the temporal spacing of overflights,
3. Increasing aircraft distances from the visitors.

METHOD:

1. Select National Park site with sufficient numbers of military overflights and visitors.
2. Conduct questionnaire pre-test as "cognitive interviews".
3. Conduct simultaneous noise measurements and visitor surveys at one site.
4. Associate acoustic "doses" with each visitor's reaction or "response".
5. Conduct statistical analysis to determine the effect of various doses (sound levels) on visitor reactions (the dose-response relationships).
6. Determine whether the three management actions could alter the visitor dose-response relationships.

1. Selection of Specific National Park Site

Six parks were investigated in detail, White Sands National Monument (Big Dune Trail) selected. The following table summarizes the data used to make this selection.

Criteria	Parks Considered					
	Cape Lookout	Death Valley	Gulf Islands	Joshua Tree	Organ Pipe	White Sands
PARK DATA						
Contact	Bill Harris	Ed Forner	Gary Hopkins	Ernie Quintana	Tim Tibbits	Nancy Wizner
Visitation Rate		200 - 500 / day	500 / day	(counts needed)	50 - 100/day	300/day (Big Dune) 150/day (Alkali Flat)
Visit Duration		few hours	half to full day	1 - 2 hours	1 - 3 hours	hour plus
Visit Season		Winter	May - Aug	Sep - May	Dec - Mar	May - Sep
Outdoor Site		yes	beach / picnic shelters	yes - trails	yes	yes - trails / dunes
Access Controlled		yes	boat or ferry only	yes	yes	yes
AIRSPACE DATA						
Contact		(Ed Forner)	(Gary Hopkins)	Lt. Cdr. Mace	Rick Moiseo (VR263) Rusty Arbeit (VR260)	Dan King Sam Sandoval
Overflight Rate	Virtually none	1 - 5 / day	up to dozen, sometimes none	twice / week	20 / month (VR263) 50 - 150/month (VR260)	100 - 150 / day
Airspace Type			VR179	VR1257	VR263 VR260	departure corridor, runways 22, 25
Source of AC		Edwards AFB China Lake	Keesler AFB	Lemoore (Schedules)		Holloman AFB
Type Aircraft						F117, F4, T38, AT38 F106, F100 Tornado

2. Cognitive Interviews

GOAL: Gain understanding of how respondents interpret key words and phrases used in the questionnaire.

METHOD: Conduct normal interview, but after key questions of interest, ask "probe" questions.

EXAMPLE: **Normal Questions:**

Were you bothered or annoyed by aircraft noise during your visit to Big Dune Trail? Were you not at all annoyed, slightly annoyed, moderately annoyed, very annoyed or extremely annoyed?

Probe Questions:

What does the phrase bothered or annoyed by aircraft noise mean to you?

How did you select the [degree of] annoyance?

Can you describe what the noise would have to be like for you to be moderately annoyed by aircraft noise while you were here at Big Dune Trail?

RESULTS:

1. Aircraft noise appears to be a factor that visitors may not consider when asked to evaluate their park experience in an open-ended question format. As a result, open-ended questions, such as "What did you like the least about your visit to [Park]?" are probably not good indicators of the seriousness of problems from aircraft overflight noise at parks.

2. Visitors have a clear and widely shared understanding of the concept of "natural quiet and the sounds of nature." Natural quiet is viewed as the absence of any man-made sounds, allowing them to hear nature as it is.

3. Most visitors make a distinction between the terms "interference" and "annoyance." Interference is perceived as an objective term, describing something that prevents them from doing what they want to do; it is an interruption or a distraction. Annoyance is perceived as having an emotional, evaluative component. For example, many respondents associate a negative reaction "makes me mad," "causes my blood pressure to rise"- with the term annoyance.

4. Aircraft noise interference can result in annoyance but does not necessarily do so. The aircraft noise probably must exceed a certain level or number threshold before it is perceived as annoying.

5. Respondents indicate that interference can be a short-term occurrence, such that once the noise source has passed the perceived interference ends. Annoyance, however, because of the emotional component is more long-lasting. It seems reasonable to consider annoyance as the reaction that causes a visitor to evaluate the experience as negative or to consider registering a complaint.

3. Simultaneous Noise Measurements and Visitor Surveys

GOAL: Collect measured sound level data of the sounds that visitors could have heard while at the site, and interview each visitor prior to their departing the site.

METHOD:
1. Set up low-noise sound monitor in central location on site, not readily in view of visitors.
2. Observer keeps second-by-second log of all sounds heard, using pre-set hierarchy to identify each sound.
3. Second observer notes time of arrival of each visitor group at site.
4. Trained interviewer intercepts each visitor group as they return to their car.

RESULTS: Obtained 381 interviews, 351 with associated sound level and observer logged data.

4. Association of Acoustic Dose with Visitor Response

GOAL: For each visitor interviewed, associate specific sound levels that occurred during his / her visit to the site with their answers to the survey, and with the observer's identification of the source of the sounds.

METHOD:
1. Software used to make full association, using visitor arrival and interview times to select proper window of sound level information and to select observer's source identification data.

2. Some additional manual calculations required. For example, to associate slant distance to closest aircraft with visitor.

RESULTS: Obtained 351 successful visitor interviews matched with noise and observer data, 331 of whom heard aircraft and had measured doses.

5. Statistically Determine Dose-response Relationships

GOAL: Develop statistically supportable functional relationships between two "doses" of aircraft sound and two types of visitor responses.

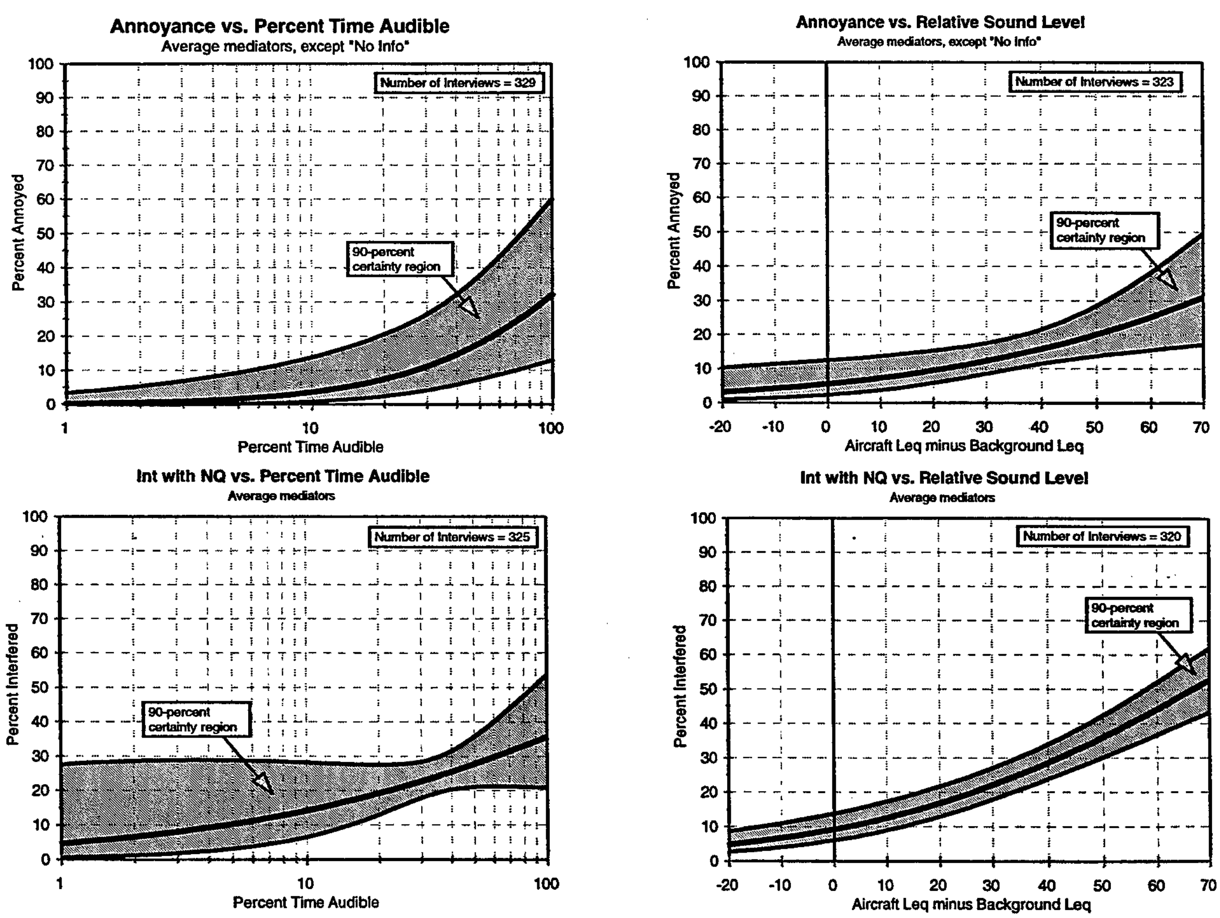
METHOD: Logistic regression used for the doses:

1. Percent of time audible - the percent of the time the visitor was on the site that the observer heard aircraft noise;
2. Relative Sound Level - the difference between the equivalent sound level of the aircraft and the equivalent level of all non-aircraft sound, during the time the visitor was on the site.

Relative to the responses:

1. Percent of visitors who responded that aircraft noise was moderately, very, or extremely annoying:
2. Percent of visitors who responded that the sound of aircraft moderately, very much or extremely interfered with their appreciation of the natural quiet.

RESULTS: These plots summarize the four combinations of doses and responses based on 351 interviewed visitors, 331 of whom could have heard aircraft and for whom doses were calculated. Final numbers of interviews available for each curve are as noted.



6. Effects of Three Management Actions

GOAL: Determine whether providing visitors with information about overflights, changing the temporal spacing of flights, or moving the flights further away (other than the effect on sound level) will lower or alter visitor response.

METHOD: Examine the effects of appropriate mediating variables on the dose response relationships.

RESULTS: The mediators examined and the effects found were:

1. **Providing information**

   The method for providing information was the hanging of an NPS format sign at the trail head saying: "Military aircraft can regularly be seen or heard on this trail." The sign was up for about half the visitors interviewed. Whether the sign was up or down had no significant effect on the percent of visitors annoyed. Further, only 40% of the visitors who could have seen the sign remembered seeing it.

   However, about one-fourth of all visitors, even when there was no sign, remembered seeing or hearing some information about aircraft. By examining the responses of visitors who remembered any information about aircraft, whether from the sign or from some other source, the annoyance reaction was found to be statistically lower for those remembering information than for those who could not remember hearing or seeing any information.

   Notably, remembering information had no significant effect on visitor reports of interference with appreciation of natural quiet. This result conforms with the cognitive interview result that interference is a more objective measure of reaction - either the sound interferes or it does not. There seems to be little emotion connected with judgements of interference, so that even if aircraft are expected, they can still interfere with appreciation of natural quiet.

   Conclusion: Visitor annoyance with aircraft overflights may be reduced by providing information about the likelihood of the overflights; i.e., by trying to alter visitor expectations about what they may experience. However, because only 40% of the visitors who could have seen the sign remembered seeing it, information about overflights should probably be provided at several different opportunities. For White Sands, such information could be provided in the visitor center (information about White Sands Missile Range and about Holloman AFB), and with some signage.

2. **Grouping of Aircraft**

   Grouping aircraft together, so that several pass in close succession rather than as individual events, may lower visitor annoyance, though with somewhat less statistical significance than the effects of information discussed above.

Additionally however, it should be noted that the metric of percent of time aircraft are audible incorporates the concept of grouping; that is, the closer aircraft overflights are grouped, the smaller the percent of time they would be heard. Hence, this metric automatically accounts for the effects of aircraft grouping.

Conclusion: If possible, grouping overflights closer together can provide some additional mitigation of annoyance. This grouping may be thought of as lowering the percent of the time aircraft are audible, but without changing the number of flights. [This result suggests that equal sound energy may not always have the same effect on human response - that hearing aircraft less is better, even if equivalent levels remain the same.]

3. **Distance to Aircraft**

The effect of distance was investigated by examining the dependence of visitor response on distance to closest aircraft, closest aircraft Sound Exposure Level, and closest aircraft maximum level. None of these mediators contributed significantly beyond the effect of lowering sound level, which is already incorporated in the dose-response curves.

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The report describes these steps in detail. For the reader who wishes more information, but without full technical descriptions of all the steps, Sections 2 (Introduction), 3 (Dose-Response Method), and 7 (Data Analysis and Results) should provide adequate background and understanding. Readers interested in details should include Sections 4 (Site Selection), 5 (Data Collection) and 6 (Data Reduction). From reading all these sections, the reader may decide whether or not to read the appendices that document in considerable detail the data analysis. Attachment 1 provides detail on the Visitor Intercept Survey Method.

2. INTRODUCTION

In 1987, the U.S. Congress passed Public Law 100-91 requiring that the National Park Service (NPS) study the effects of aircraft overflights on the National Parks.[1] As part of the study, the NPS collected information that permitted development of functional relationships between the sounds produced by aircraft overflights and visitors' responses to those sounds. These relationships, termed "dose-response" relationships, permitted estimates of how many visitors might report being annoyed or might judge the sound of aircraft to have interfered with their appreciation of the natural quiet.[2] Results of the study were developed in a way and presented in a format intended to aid park service and air space management personnel develop methods that minimize the adverse effects of overflights on park lands.

These results, however, were developed from data gathered in parks where the overflights were almost exclusively by air tour aircraft - fixed wing propeller aircraft carrying approximately 20 or fewer passengers, and rotary wing aircraft capable of carrying 4 to 6 passengers. Hence, the applicability of study results to overflights by other types of aircraft, and specifically by military jet aircraft, is unknown.

The Department of Defense is aware that military flight training activities may adversely affect some recreational users of public lands, and is interested in exploring whether there are management or operational means for reducing such adverse effects. Accordingly, the U.S. Air Force contracted with Harris Miller Miller & Hanson Inc. (HMMH) to develop and conduct a study that has two goals:

1. Quantify National Park visitors' reactions to military jet aircraft overflights;

2. Determine whether three specific management actions can significantly reduce or mitigate adverse visitor reactions to these overflights. The three specific actions are:

   2.1 Providing visitors with information about overflights,

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1 Results of all studies and analyses are presented in the Department of the Interior / National Park Service Report to Congress, "Report on Effects of Aircraft Overflights on the National Park System," July 1995.

2 The NPS dose-response study is described in detail in Anderson, G.S., *et al*, "Dose-Response Relationships Derived from Data Collected at Grand Canyon, Haleakala and Hawaii Volcanoes National Parks," NPOA Report No. 93-6, October 1993.

2.2 Altering the temporal spacing of overflights,
2.3 Increasing aircraft distances from the visitors.

The first goal, quantifying reactions to military jet overflights, is not merely informative, but provides the baseline information necessary for examining the second set of goals. Establishing the baseline permits determination of how much each mitigation measure alters visitor reactions. The three mitigation measures are designed to be tools that the military and the NPS may use to reduce adverse effects. In essence, they are tools that could be useful for situations where elimination of military overflights of park lands is not possible.

The first of the management actions is directed at visitor expectations. One of the most useful predictors of visitor reaction to disruptive effects in the recreational experience is a knowledge of visitor expectations[3]. Expectations or "preference standards" help define what is appropriate for different kinds of experiences, and many studies of disruptive effects in outdoor recreation areas (especially of crowding and conflict) are based on this concept of preference standard[4]. By providing visitors with information about potential overflights, can visitor expectations be altered and reactions changed?

The second management action, altering temporal spacing of overflights, addresses the concept of whether it is better, from a visitor reaction perspective, to fly aircraft closely spaced (in time) or spread out. For example, are visitor reactions to five aircraft flying by in one minute different from their reactions to five aircraft overflights spread across an hour?

Third, will increasing the distance between visitor and aircraft overflight decrease visitor adverse reactions? Naturally, increasing the distance for a given overflight will decrease the sound level and should, based on findings of previous NPS research, lower adverse reactions. But this goal will attempt to answer a somewhat more subtle question: If a nearby overflight produces the same sound level as a distant overflight, will visitor reaction be different? Put another way, is proximity an important determinant of visitor reaction?

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[3] Schreyer, R. and J. Roggenbuck, "The Influence of Experience Expectations on Crowding Perceptions and Social Psychological Carrying Capacities," Leisure Sciences 1(4), 1978.

[4] Shelby, B., "Contrasting Recreational Experiences: Motors and Oars in the Grand Canyon," Journal of Soil And Water Conservation, 35(3),1980
Shelby, B. and Heberlein, T., Carrying Capacity in Recreational Settings, Oregon State University Press, Corvallis, 1986.

This report describes the study that has been conducted to pursue these goals. The next section, Section 3, provides a summary description of dose-response relationships, how they are developed, and how they may be used. Section 4 describes how a site was selected for collecting the data used to analyze visitor responses to military jet aircraft overflights. Sections 5 and 6 summarize how the data were collected and reduced, and Section 7 describes the analyses that were conducted and the results.

3. DOSE-RESPONSE METHOD

3.1 Overview

Dose-response relationships, as used here, are functions (curves) derived from data of aircraft sounds visitors could have heard (doses) and visitor reports of their attitudinal responses to those sounds. Figures 3.1, 3.2, 3.3 and 3.4 present the dose-response relationships developed in this study.[5] The curves of Figures 3.1 and 3.2 show, Big Dune Trail at White Sands National Monument, the percent of visitors annoyed as a function of the percent of time aircraft were audible (Figure 3.1) and as a function of the "relative sound level"of audible aircraft (Figure 3.2). Figures 3.3 and 3.4 show for this site the percent of visitors who reported interference with their appreciation of natural quiet. Though these relationships need further description (provided in Section 7 and Appendix B), they can help in understanding how this current study examines reducing (mitigating) the effects of military jet overflights on visitors.

1. <u>Doses</u>

A dose may be any quantity that reliably measures sound level, sound exposure, or some other quantifiable aspect of the audible sound produced by aircraft. In Figures 3.1 and 3.3 the dose is simply the percent of the time a visitor at the site could have heard aircraft, had he or she been listening intently. It is measurable without instrumentation other than a stop watch. The dose metric used in Figures 3.2 and 3.4 is a level or decibel-based metric that requires a sound level meter or monitor, and is computed as the difference between the aircraft and the non-aircraft noise - in other words, a measure of aircraft sound intrusion.

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5 Section 7 and Appendix B provide a complete description of these curves and their derivation.

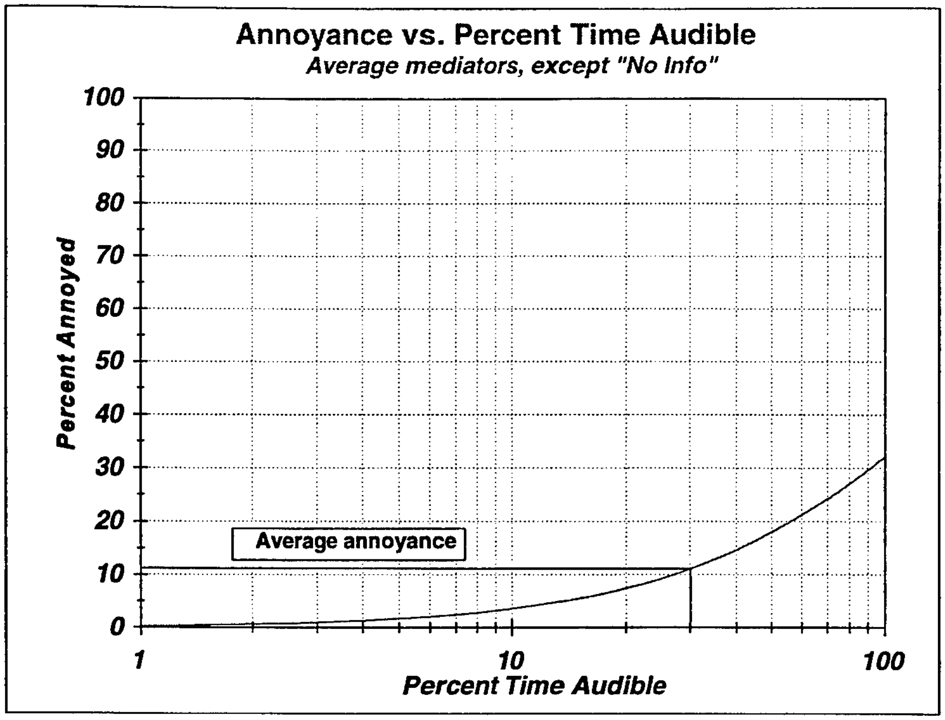

Figure 3.1. Dose-Response for Visitor Annoyance vs Percent of Time Aircraft are Audible

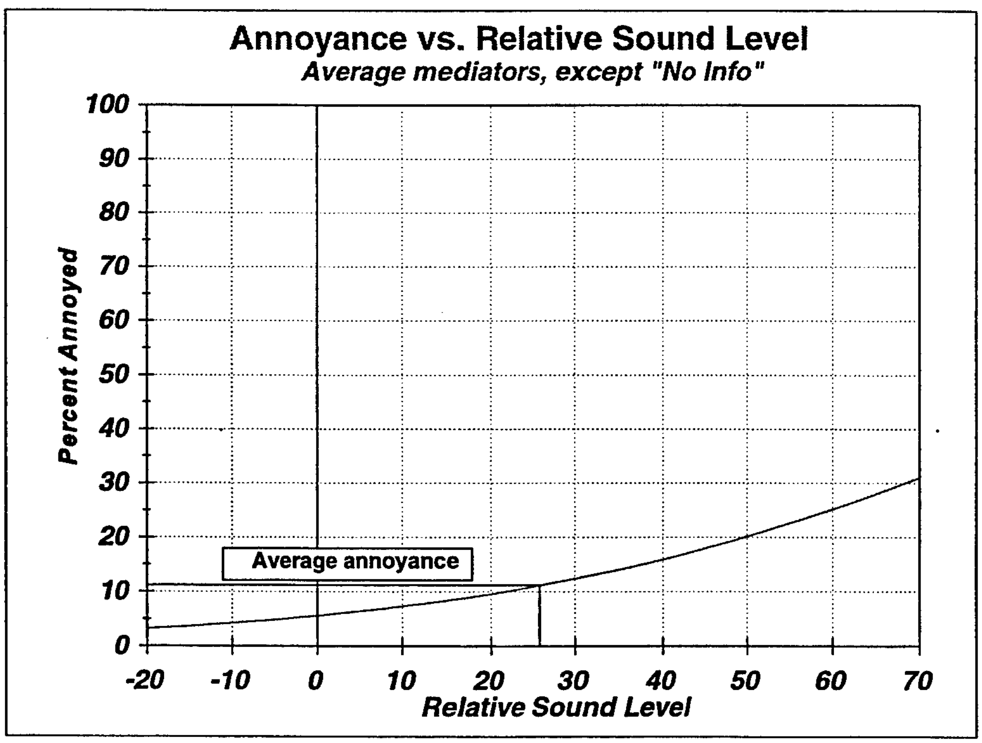

Figure 3.2. Dose-Response for Visitor Annoyance vs Relative Sound Level

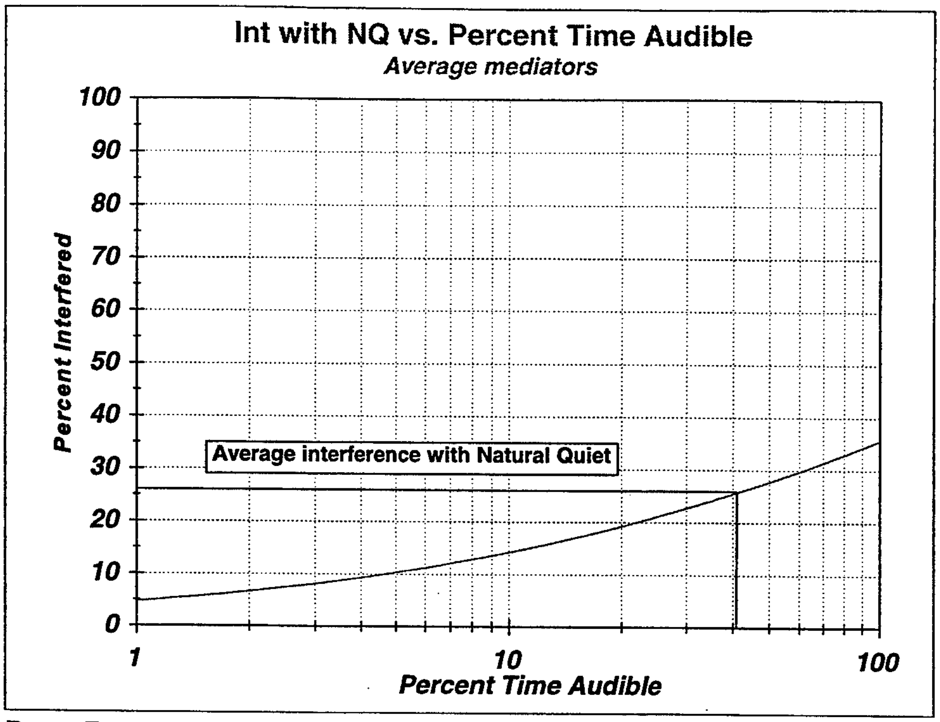

Figure 3.3. Dose-Response for Interference with Natural Quiet vs Percent of Time Aircraft are Audible

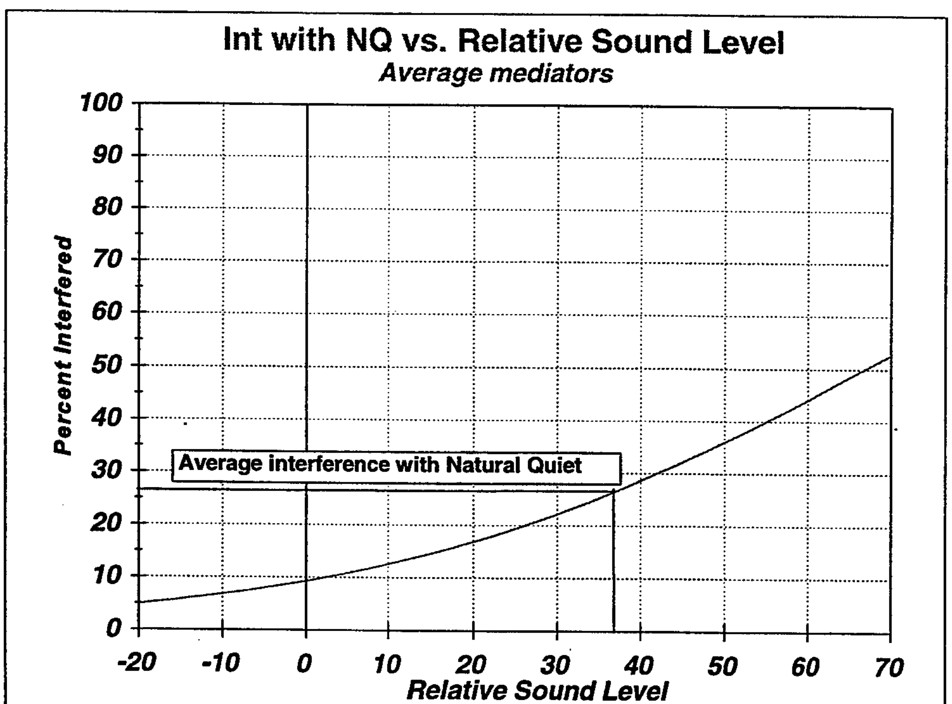

Figure 3.4. Dose-Response for Interference with Natural Quiet vs Relative Sound Level

2. Responses

Different responses can provide different types of useful information. Annoyance is the response traditionally used for studies of communities around airports, along highways or rail lines.[6] It is considered an integrated response in that it represents a person's overall opinion based on the outcome of the sum of the reactions to a sound. Though it does not reveal anything about why the person is annoyed or exactly what annoyed the person, it does, however, provide a means for rank-ordering responses. It has also been found to correlate with interference with visitor enjoyment, a more common concept in recreation studies.[7] The cognitive interviews conducted as part of this study, see Section 8, revealed that visitors generally think of annoyance as an emotional reaction - "raises my blood pressure" - which may not disappear after the sound passes.

Figures 3.3 and 3.4 show the response "interference with [appreciation of] natural quiet" as a function of percent time audible and relative sound level. This response, compared to annoyance, has been found to be more sensitive to overflight sound. That is, for a given level (dose) of overflight sound, more visitors will say that aircraft sound interferes with their appreciation of natural quiet than say they are annoyed. The cognitive interviews suggest that visitors regard "interference" as an objective result of sound intruding into the soundscape of the natural environment; when the sound ends, interference ends.

3. Visitor Activities

Different visitor activities appear to have different sensitivities to aircraft sound. Data presented in the Report to Congress showed how the responses of visitors at five sites differed from site to site (see Figures 6.8 and 6.9 of the report referenced in footnote 1). The visitors at the "Sliding Sands" site appeared considerably more sensitive to aircraft sound than did the visitors at the Lipan Point site. Sliding Sands was a site where visitors hiked for half an hour or more. At Lipan Point, visitors walked only a few hundred yards from their cars to view the Grand Canyon, then returned to their cars.

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[6] See Schultz, T.J., "Synthesis of social surveys on noise annoyance," J. Acoust. Soc. Am. 64(2), Aug. 1978 and Fidel, S. *et al*, "Updating a dosage-effect relationship for the prevalence of annoyance due to general transportation noise," J. Acoust. Soc. Am. 89(1), January 1991.

[7] See Chapters 6 and 9 of the Report to Congress, particularly Table 6.5 and Figure 9.6. (The correlation coefficient of annoyance with interference with enjoyment is .95)

4. Mediating Variables

Different factors or mediating variables can affect visitor sensitivity to the sound of overflights. Analysis of the National Park Service dose-response curves, as provided in the Report to Congress, revealed three variables that can alter visitor sensitivity. From the Report to Congress:

> First time visitors to a site are less sensitive to aircraft sound than are repeat visitors; visitor "groups" of one or two people are more sensitive than are larger groups; visitors who thought enjoying the natural quiet and sounds of nature was a very or extremely important reason for visiting the site were more sensitive to aircraft sound than visitors who judged quiet and sounds of nature as less important. These three factors can have a significant effect on visitor response. Repeat visitors, or groups of 1 or 2, or visitors who rate quiet as very important respond as if the sound were about two to three times as long or about 20 dB louder when compared with first time visitors, larger groups, or visitors who do not so highly value quiet.[8]

To pursue the goals of this study, dose-response relationships based on visitor reactions to military jet overflights were developed. Several doses were measured, as well as several visitor responses. Such data permitted development of the dose-response curves shown in Figures 3.1 through 3.4. The data behind these curves tell: 1) how sensitive visitors are to military jets; 2) whether and how much the three mitigation measures affect this sensitivity.

The remainder of this section briefly describes the general methods of data collection, reduction and analysis, while Sections 5, 6 and 7 discuss the details and results of these efforts. Section 4 discusses selection of a site where the data will be collected.

3.2 Data Collection

Three primary types of data were collected simultaneously: acoustic, aircraft related and visitor related. An aircraft observer collected acoustic and aircraft identification and position data by using sound monitoring equipment, event logging and photography of aircraft. An interview team logged the entrance of visitors into the area, intercepted them as they are about to leave, and conducted a 5 to 10 minute interview. The site was chosen so that visitors can easily be observed

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8 Report to Congress, p. 146.

arriving and departing and so that they will be outdoors the entire time, (see Section 4). All data were time synchronized.

Photography was the primary method for determining distance from the site to each aircraft overflight. Thought radar data were also collected during the sound measurement and survey period, these data were not needed.

3.3 Data Reduction

The data were assembled into a single database with a record or string of variables for each visitor surveyed. For each visitor, the doses, responses and mediating variables were computed and / or coded into the database. Because the time of visitor entrance to the area and the time of the intercept interview were known, sound metrics were determined for each visitor's specific time on the site. Table 3.1 lists the primary types of variables that were analyzed for each visitor surveyed.

3.3.1 Doses

The doses are those that were measured for the time period while the visitor was at the site, and will therefore be representative of what the visitor could have heard or experienced. Four basic types of doses were determined for each visitor. First, a dose was computed that does not depend on level, but only on amount of time aircraft can be heard - percent of time audible. This dose was found to correlate well with visitor responses in the previous work,[9] and it bears an easily understood connection to interference with natural quiet. Second, a decibel metric of the aircraft sound was determined from the measurements: the aircraft "equivalent level." This dose depends solely on the aircraft produced sound energy. Third, a decibel metric of the non-aircraft sound environment was computed: the non-aircraft "equivalent level." Finally, these two decibel metrics were used to compute a "relative dose" that quantifies the difference between aircraft sound and non-aircraft sound. This metric is the difference in decibels between aircraft and non-aircraft equivalent sound levels, and may be thought of as a measure of aircraft sound intrusions.

In simplified form, the relative dose metric may be described by the following expression.

$$Relative\ Dose = L_{eq,aircraft} - L_{eq,\ background}$$

Where $L_{eq\ aircraft}$ is the equivalent level measured during a visitor's stay at the site while aircraft were audible. Because measured aircraft sound levels are sometimes very low, and nearly the same level

9 Anderson *et al*, (1993) Appendix H, see footnote 2.

as the background sound, $L_{eq\ aircraft}$ is adjusted to account for the presence of background sounds during the aircraft event. The background sound level during each aircraft event is estimated from the time periods before and after the event when no aircraft were audible. (For a complete mathematical description of the calculation of the doses, see Section 6.3.)

Table 3.1. Primary Doses, Responses and Mediators that were Determined for Each Visitor Surveyed

Type of Variable	Examples
Doses	Percentage of time that aircraft can be heard (by an intent listener) Aircraft equivalent sound level, $L_{eq,AC}$ Non-aircraft equivalent sound level, $L_{eq,nonAC}$ Aircraft equivalent sound level minus non-aircraft equivalent sound level, $L_{eq,AC} - L_{eq,nonAC}$
Responses	Annoyance due to aircraft sound Interference with: Appreciation of natural quiet and sounds of nature
Mediators	**Of interest for potential mitigation** Overflight information provided to visitor: yes or no Temporal spacing of aircraft Distance to aircraft **Visitor-related** Number of adults in visitor group Number of children in visitor group Importance of enjoying natural quiet and sounds of nature First visit to site: yes or no Gender Age

3.3.2 Responses

The responses were determined from visitor answers to two questions:

"Where you bothered or annoyed by aircraft noise during your visit to (NAME OF SITE)?"

"Did the sound from aircraft interfere with your appreciation of the natural quiet and the sounds of nature at the site?"

Response choices were: 1) not at all; 2) slightly; 3) moderately; 4) very; 5) extremely.[10]

To conform to the standard logistical analysis, responses were thus quantified and then "dichotomized" or divided into a "no" and "yes". Most community dose-response studies around airports divide responses between "moderately" and "very" and thus considers answers 4) and 5) as being "yes" or "highly annoyed."[11] Previous NPS work considered answers of a 1) or a 2) as not annoyed (no), and answers of 3), 4) or 5) as annoyed (yes). This study used the same dichotomization as that of the National Park Service studies.

3.3.3 Mediators

Mediators are variables that alter visitor response; their values can shift the dose-response curves to the right (less sensitive) or to the left (more sensitive). For example, as mentioned above (see quote, page 15), previous NPS work found that visitors who have been to the site before are more sensitive to aircraft overflight sound levels than are first-time visitors. That is, for a given amount of overflight sound, a larger percentage of repeat visitors than of first-time visitors will be bothered. Mediators provide the means for pursuing the primary goals of this study: the ability of the three management actions to mitigate adverse effects of military jet overflights on visitors. Table 3.1 presents the primary mediators that were analyzed for effects on visitor responses.

<u>3.3.3.1 Overflight Information Provided to Visitors.</u>

A method was needed to provide visitors with as neutral a message as possible about the possibility of overflights. Thought was given to developing and providing a brochure. But ensuring that visitors both received and read such information was judged too difficult for easy testing or implementation at parks. Rather, because signage is used in parks to convey information, and is relatively inexpensive to implement, use of a single sign, posted at the site entrance was selected as the method to convey aircraft overflight information. A sign was designed and constructed and

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10 The full questionnaire is included as Appendix A. This questionnaire is essentially identical to the one used for previous NPS data collection, Anderson *et al*, (1993).

11 Schultz (1978), see footnote 6, discusses dichotomization and "percent highly annoyed" in some detail and is worth reviewing when considering dichotomization for park visitor responses. Schultz was interested primarily in annoyance sufficient to induce complaints or political action. In the park situation, the management objective is often preservation of the natural soundscape, and such preservation relates more to whether aircraft are audible, than to whether visitors are sufficiently annoyed to complain. Thus, "moderate" annoyance or "moderate" interference with the sounds of nature is of interest for management purposes.

posted for roughly half the data collection period. It was alternately set up for different periods of the interview period, distributing sign postings throughout both the mornings and afternoons. Many wordings were possible, but the following was selected:

"Military aircraft can regularly be seen and heard on this trail."

3.3.3.2 Temporal Spacing of Overflights.

To explore temporal spacing of overflights, three methods were used. First, the number of audible aircraft events per time was used. This is the number of continuous periods of aircraft audibility, and one such "event" could include several aircraft flyovers, each one audible while another aircraft was audible. This metric was examined for significance as a mediator in each of the four dose-response relationships (percent time audible or relative sound level vs percent annoyed or interfered with). Second, when analyzing the dose-response relationships that used the dose "percent time audible", aircraft L_{eq} was examined for significance as a mediator. Third, when analyzing the dose-response relationships that used the dose "relative sound level", the significance of "percent time audible" was tested. In each case, a finding of significance for any of the mediators would imply that both amount of sound energy (relative sound level) and amount of time aircraft are heard are important in determining annoyance or interference. In any case, only the number of aircraft events had some significance for the dose-response combination of annoyance vs relative sound level. This limited significance means that, for a given intrusion in terms of relative sound level, people were somewhat less annoyed if aircraft were grouped in fewer rather than more aircraft events, see Section 7 and Appendix F.

3.3.3.3 Distance to Aircraft.

Distance from the visitor to the aircraft was estimated photographically. A simple procedure requiring only knowledge of the actual aircraft length and the focal length of the camera was used to compute the distance from the camera to the aircraft.[12] The photographs were taken when the aircraft was at its closest point to the observer, and a full profile photo was possible.

3.4 Data Analysis

Data analysis was performed with a statistical analysis method called "logistic" regression. This method uses doses and associated responses for individual visitors to derive the relationship that

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12 This procedure is described in a Society of Automotive Engineers (SAE) Aerospace Information Report (AIR) 902, May 15, 1966.

best predicts the responses from the doses. Responses, as mentioned, are first divided into "yes" or "no", and the logistic regression determines the curve that best predicts the percent of "yeses" for each value of dose. For example, in Figure 3.2, the curve shows that about 15 percent of the visitors reported annoyance (answer yes where yes is moderately, very or extremely annoyed) for a relative sound level of 40 dB. Logistic regression is a special form of curve fitting to data points that has two important properties that meet the needs of dose-response data: 1) logistic regression works with responses that are binary - yes or no; 2) logistic regression derives a curve that can never go below zero percent or above 100 percent.

A baseline dose-response curve was derived for the data collected at Big Dune Trail. Then, the effects of various mediators were tested to determine whether they significantly and reliably altered the baseline. For example, this type of analysis tells whether those visitors who saw, and remembered seeing, the sign were less sensitive (less bothered) than those who did not see the sign. (The analysis also tells what percent of visitors remembered seeing the sign when it was posted.) Through this analysis, the effects of the sign, the distance from the aircraft, the spacing of the aircraft, the number of people in the group, the group size, etc. were determined.

Results of the analysis yielded tools for better management of overflight impacts. For example, it was found that visitors who remembered seeing or hearing information about military overflights were less sensitive (in terms of annoyance) than those visitors who did not remember such information. Hence, providing information to visitors about overflights should be considered a viable approach for park areas where such flights are unavoidable.[13]

[13] It is a common experience, when working with community groups, that providing information about the causes of the noise and taking actions to minimize that noise reduce community concerns. The Federal Aviation Administration's "Part 150" program that includes considerable public participation has had many successes in reducing community noise exposure, and in satisfying residents that thorough, organized efforts are being made to reduce the effects of aircraft noise.

4. SITE SELECTION

Efficient collection of data depends upon selection of an appropriate site. The primary limitation on collection of adequate data is the high labor content of data collection. In choosing a site, therefore, it is important that a sufficient amount of data (visitor interviews and aircraft overflights) can be collected in a reasonable amount of time. In choosing such a site, several criteria were considered and the following section highlights the primary considerations.

4.1 Selection Criteria

1. Sufficient Aircraft Overflight Activity. Visitors who pass through the study area should have had an opportunity to hear aircraft overflights, i.e, to receive a dose. Ideally, two to four flights per hour are desirable.

2. Sufficient Visitor Activity. Visitors should be of sufficient number that interviews would be closely spaced. Five to 10 visitor groups per hour is preferred.

3. Minimum Visitor Duration. If most visitors are to have an opportunity to hear aircraft, they should be in the study area long enough to hear one or more of the aircraft overflights. The minimum desirable visitor duration is judged to be about 15 minutes, though longer times are preferred.

4. Little or No Study Area Development. Minimum or no indoor facilities (visitor centers, restaurants, gift shops, etc.) should be present in the study area. Visitors entering and leaving buildings would make estimation of their dose virtually impossible.

5. Ease of Access to Study Area. Access should be by car or bus, and preferably through a single entrance point. Access only by foot or horseback would significantly slow data collection efforts and would also limit visitor activity.

6. Minimal Other Significant Noise Sources. Minimal interference from other noise sources such as buses idling, car starts and door slams would increase the quality and efficiency of data collection.

7. Low Wind Speeds. Significant wind hampers acoustic data collection due to wind noise generated by turbulence around the microphone.

8. Small Study Area Size. Small size is desirable to minimize the variation of dose across the area. A scenic overlook is considered small, while a mile-long trail is considered large. Large study areas could be considered if several sound monitors could be installed across the area, or if aircraft are high enough that sound levels are comparable across the site.

9. English-Speaking Visitors. The higher the proportion of English speaking visitors, the greater the number of potential respondents, since the survey will be conducted only in English with visitors who are judged to easily understand the interviewer's questions.

10. Reasonable Security for Instrumentation. The area should be secure enough (little likelihood of tampering by curious visitors) to permit instrumentation to be left unattended for brief break periods. If instrumentation could be left set up overnight, efficiency of data collection would be improved.

HMMH personnel contacted both National Park Service personnel and Department of Defense airspace personnel to identify the best sites for data collection. Table 4.1 summarizes the results of the phone conversations with these personnel. Park personnel were first contacted to provide general impressions of site possibilities and perceived numbers of overflights. In most cases, military personnel knowledgeable about airspace were also contacted to learn about airspace use in terms of numbers, aircraft types and seasonality of operations, if any. For all parks surveyed, only White Sands National Monument was judged to experience sufficient overflights on a regular basis to warrant further investigation and a site visit.

White Sands National Monument experiences overflights of departures from Runways 22 and 25 at Holloman AFB, and, in fact, is under a SID (Standard Instrument Departure) for those runways. About 100 departures per day can be expected, and visitation rates appear sufficiently high and consistent over time (see following sub-section).

The selected site at White Sands, Big Dune Nature Trail, is popular during the summer season, with most visitors at the site between early morning and 10:00 and around sunset, since mid-day is too hot. Visitors come mainly to see the dunes and the stark beauty of the location. It is a trail approximately one mile long and requires from fifteen minutes to one hour to complete, depending upon visitor interest. It is marked with 19 numbered "Stations", each of which has descriptive information about the ecology and geology of the area.

Table 4.1. Site Selection Investigation Summary

Criteria	Parks Considered					
	Cape Lookout	Death Valley	Gulf Islands	Joshua Tree	Organ Pipe	White Sands
PARK DATA						
Contact	Bill Harris	Ed Forner	Gary Hopkins	Ernie Quintana	Tim Tibbits	Nancy Wizner
Visitation Rate		200 - 500 / day	500 / day	(counts needed)	50 - 100/day	300/day (Big Dune) 150/day (Alkali Flat)
Visit Duration		few hours	half to full day	1 - 2 hours	1 - 3 hours	hour plus
Visit Season		Winter	May - Aug	Sep - May	Dec - Mar	May - Sep
Outdoor Site		yes	beach / picnic shelters	yes - trails	yes	yes - trails / dunes
Access Controlled		yes	boat or ferry only	yes	yes	yes
AIRSPACE DATA						
Contact		(Ed Forner)	(Gary Hopkins)	Lt. Cdr. Mace	Rick Moiseo (VR263) Rusty Arbeit (VR260)	Dan King Sam Sandoval
Overflight Rate	Virtually none	1 - 5 / day	up to dozen, sometimes none	twice / week	20 / month (VR263) 50 - 150/month (VR260)	100 - 150 / day
Airspace Type			VR179	VR1257	VR263 VR260	departure corridor, runways 22, 25
Source of AC		Edwards AFB China Lake	Keesler AFB	Lemoore (Schedules)		Holloman AFB
Type Aircraft						F117, F4, T38, AT38 F106, F100 Tornado

4.2 Site Data for White Sands National Monument

Both NPS and the Air Force provided specific data useful for understanding the visitor / aircraft flight conditions at White Sands National Monument. Additionally, two visits were made to the site to meet local personnel and explain the study, collect information, identify a specific data collection site, and conduct pre-test cognitive interviews using the questionnaire. Results of the cognitive interviews are presented in Section 8 of this report. The following subsections summarize briefly the visitor use, aircraft flight, and weather information.

Figures 4.1 through 4.6 summarize information provided by NPS and by Holloman AFB. Figures 4.1, 4.2 and 4.3 show visitation trends for White Sands National Monument. Highest visitation rates occur March through August, with peak visitations occurring in July. Figure 4.2 shows variation in rates by day of the month. Because air operations occur almost exclusively on weekdays, Figure 4.3 replots the Figure 6 data, but for weekdays only. For these 1995 data, July clearly tends to consistently have more visitors during the weekdays than do August or September.

Figure 4.4 shows a week of operations data provided by Holloman AFB personnel. Though this particular week shows no operations on Friday, five week days of operations are the rule rather than the exception. These data show no obvious trend with day or by time of day, except that Monday was lighter in operations than the other three days for this particular week.

Three days of observations during a site visit in April 1997 to Big Dune Trail, plus observations at the site by park personnel during randomly selected 2 hour periods in July and August of 1996 yield an estimated average of three interviews per hour of visitors who have experienced one or more aircraft overflights. Additionally, with current operating procedures at Holloman AFB, there are likely to be no more than six useful hours of interviewing possible per day - 0800 to 1100 and 1330 to 1630. These initial estimates meant that no more than 90 to 100 interviews per five day week were expected.

Other factors that could have limited the number of interviews possible were primarily that aircraft depart in fairly limited time windows during the morning and afternoon, that morning levels of visitation tend to be low, and that some percentage of visitors may not speak english sufficiently well enough to provide reliable responses. Additionally, wind speeds could at times be high enough to prevent reliable acoustic data acquisition. Wind speeds over about 8 to 10 miles per hour are likely to hinder accurate measurement of non-aircraft background sound levels. Figure 4.5 shows wind speed data provided by Holloman AFB. For July, wind speeds exceed 6 kts (7 mph) about 30 % of the time. Such speeds could have further reduced the number of useful interviews.

Finally, wind directions during July tend to be more southerly than westerly, Figure 4.6, and departures may well use Runway 16 more than Runways 22 and 25. Such a change of departure runway would place aircraft more distant from, and quieter at Big Dune Trail which is West to West-South-West of Holloman. Quieter overflights are valuable to the extent that they extend the range of exposures experienced, but if too predominant, could have limited the conclusions of the analysis.

For these reasons, it was recommended that a minimum of two weeks be spent acquiring data at Big Dune Trail, and that an optional third week be possible if results in the field show less than 200 interviews have been completed at the end of the second week. It was noted that the previous dose-response work for NPS suggested that for statistical reliability of results, a sample size of 300 useful interviews is desirable.[14] Fortunately, however, the actual data collection conducted 14 to 25 July 1997 yielded closer to 200 interviews per week for a total of 349 useful interviews, see Section 7.

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14 See HMMH Proposal P95-20119, October 1995, pages 5 and 6, submitted for description and justification of this study.

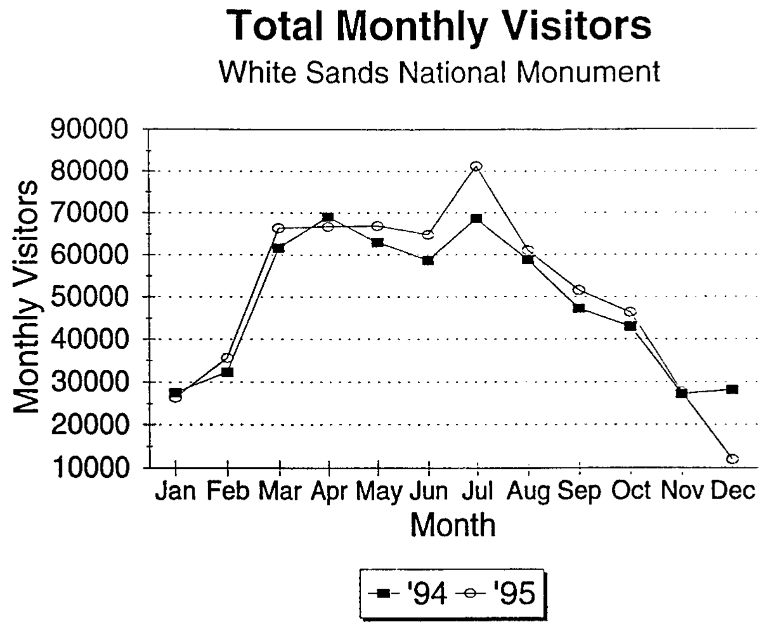

Figure 4.1. Monthly Visitation Rates - 1994, 1995

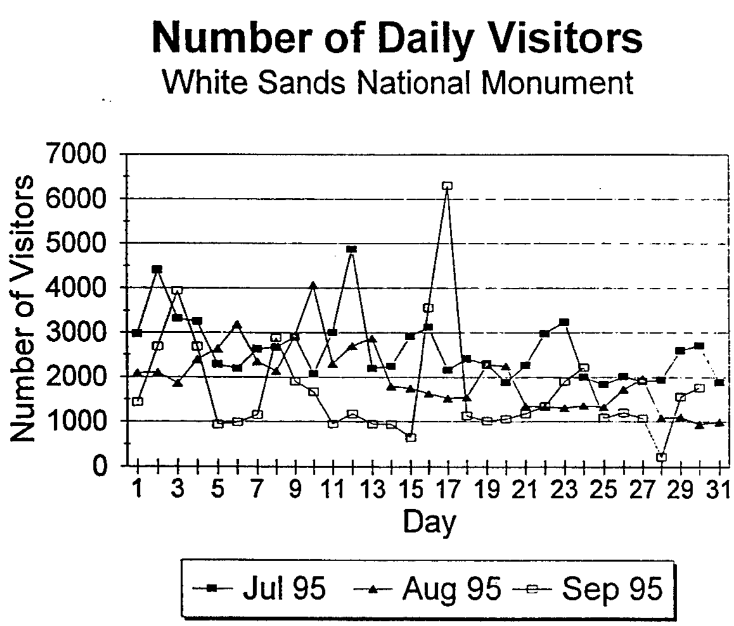

Figure 4. 2. Daily Visitation Rates - July, August, September 1995

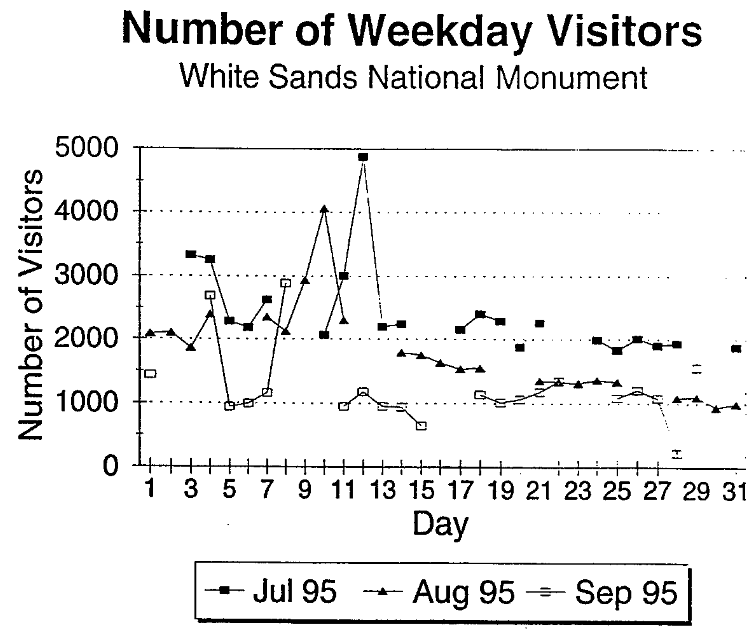

Figure 4.3. Weekday Number of Visitors - July, August, September 1995

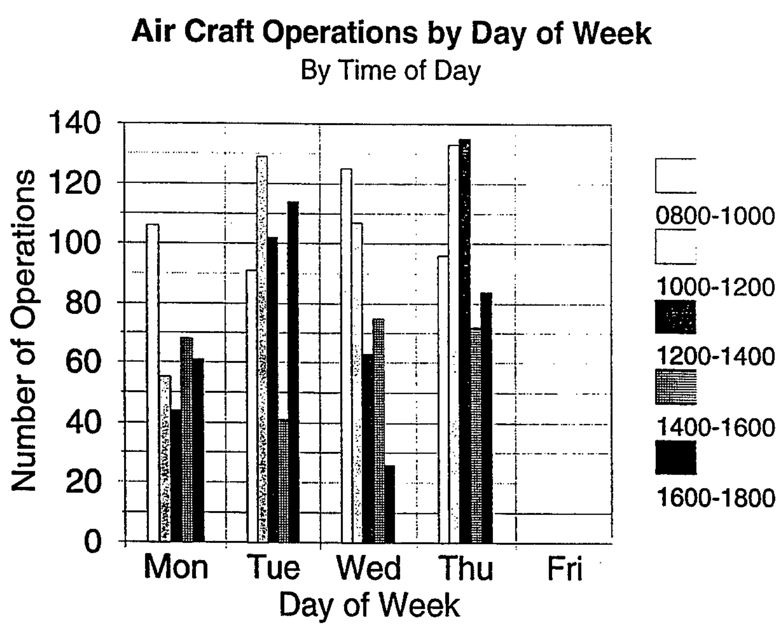

Figure 4.4. Aircraft Operations by Time, by Day of Week

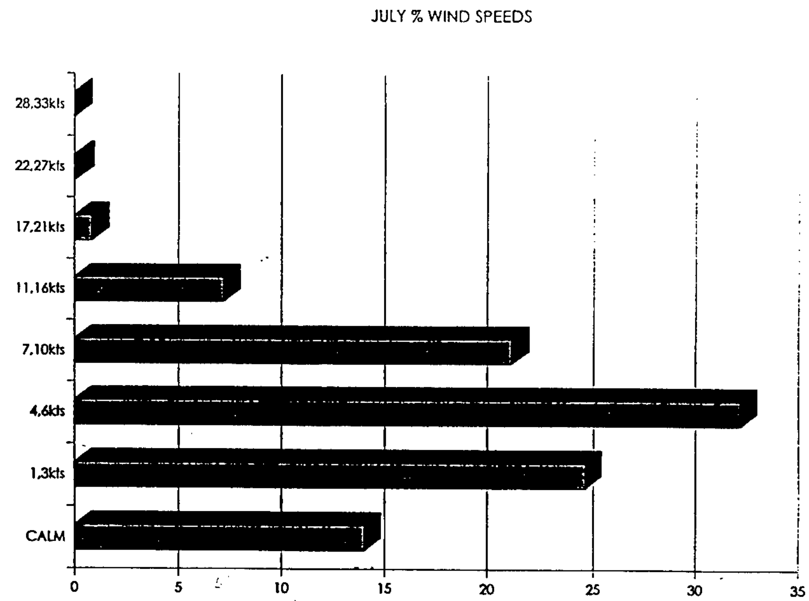

Figure 4.5. Distribution of Wind Speeds for July

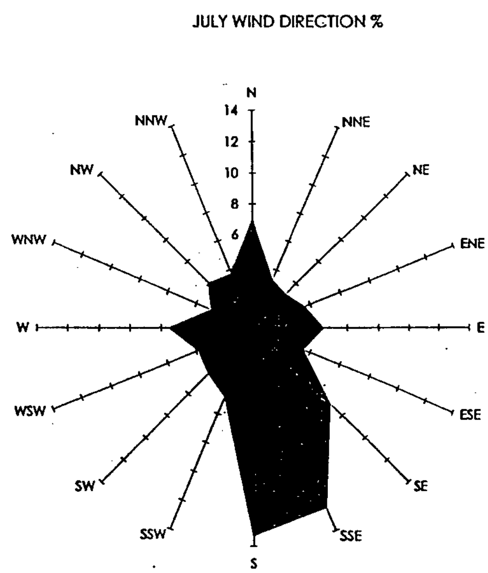

Figure 4.6. Distribution of Wind Directions for July

5. DATA COLLECTION

The data collection phase of the project consisted of three tasks: determining the siting of instrumentation and personnel, instrument preparation and checkout, and field data collection. At the conclusion of the data collection effort, all raw field data were in machine-readable form and ready for processing in the data reduction phase. The protocol was virtually identical to that used in earlier NPS dose-response studies.[15] It used the same acoustic data collection instrumentation, the same continuous, computer-based aircraft and background noise source logging methodology, and the same visitor survey techniques.

Two pilot visits to White Sands National Monument were completed, and the selected site was the Big Dune Nature Trail (a loop trail approximately one mile in length). The visits fulfilled three important project objectives. First, they helped establish site-specific functional requirements for both acoustic and interview data collection by providing first-hand observations of actual physical conditions. Second, they provided an opportunity to meet both park and air base personnel and to collect general information about visitation rates and level of aircraft operations. Third, they provided an opportunity to pre-test the questionnaire, develop estimates of time required to acquire adequate data for analysis, and conduct cognitive interviews, see Section 8.

5.1 Data Collection Protocol

The data collection protocol employed a single, fixed-position acoustic measurement site staffed by two aircraft observers and two or more interviewers to administer the survey questionnaire to park visitors. The aircraft observers set up, calibrated and operated the acoustic instrumentation. Two were necessary to spell each other from the intense sun and heat that are common at the site. The data collection protocol was designed so that an acoustic dose could be computed for each survey respondent based on the time the respondent was in the study area prior to the interview. The protocol stressed reliability and consistency of day-to-day data collection through the use of experienced staff; high-quality, readily available instrumentation; and proven, easy-to-administer field survey procedures.

The data were collected by two teams: a dose team (staffed by HMMH personnel) and a response team (staffed by Hagler-Bailly personnel). The dose team was responsible for the measurement and documentation of the acoustic data that were used to calculate individual visitor doses. The dose team also photographed aircraft overflights for determination of slant distances. The response team

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15 See footnote 2.

was responsible for tracking the arrival times and movements of the individual park visitors and for administering the survey questionnaire.

The key to combining the two data sets for calculating an accurate acoustic dose for each visitor is time-synchronized data acquisition: Instrumentation and interviewers worked off a common time base. To meet this requirement, all field personnel used digital wristwatches displaying hours, minutes, and seconds. One timepiece served as the master, to which all others were set or adjusted. Each piece of noise data acquisition equipment contained its own digital clock; these clocks were also set from the master timepiece.

At the beginning of each measurement day, all personnel assembled to ensure that every watch reads within one second of the designated master watch before data collection begins. Similarly, data acquisition equipment clocks were set at this time. Any drift from the master timepiece was documented at the end of each day with a post calibration procedure.

The calculation of acoustic doses for each visitor was accomplished by observing each visitor's entry time into the study area as well as the starting time of his or her interview. Simultaneously, all sound level measurements and aircraft observation logs were also time-stamped.

5.2 Acoustic Data Collection

The acoustic data collection protocol was designed to enable calculation of reliable doses for each visitor, using the acoustic data acquired at a single, fixed-position measurement site. The single data acquisition site has been demonstrated to work well in study areas such as this one, where the distance to the aircraft is large compared to the area traversed by respondents and where the background sound level was generally uniform over the study area.[16]

5.2.1 Instrumenting the Study Areas

Pilot Visit Observations and Functional Requirements

Both the existing conditions at the Big Dune Nature Trail study area as well as the study objectives determined the acoustic data collection requirements. The trail is circular, with one entry and exit point, making possible both measuring sound levels at a single point, and conducting interviews in one location. Through consultation with NPS personnel and by consideration of acoustic and other parameters, the measurement site was identified that would be somewhat shielded from the

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[16] See Anderson, *et al*, Section 5.4.3, referenced in footnote 2.

wind and from most of the trail. Brief sampling of sound levels showed aircraft levels, in terms of either SEL or maximum sound level, vary over a range of 25 to 30 dB. Background non-aircraft sound levels can be below 20 dBA. Human produced sounds, other than aircraft, were limited to vehicles on the road through the park, and traffic on the 2½ mile distant US route 70. Route 70 traffic can occasionally be audible depending upon wind and weather conditions.

A paved parking lot provided space for about 14 automobiles. Several signs present information to visitors, and Trail Guide pamphlets were available in boxes fastened to the sign posts.

Based on these observations during the pilot visits, and the goal of conducting the measurement program in a cost-effective manner, the functional requirements shown in Table 5.1 were established.

Table 5.1. Functional Requirements for Acoustic Data Acquisition

Number	Requirement
1	The entire instrumentation chain must be capable of measuring sound levels as high as 115 decibels and down to the human threshold of hearing.
2	The microphone should be protected from wind-induced noise by more effective means than a conventional 3½-inch diameter foam windscreen.
3	The basic instrumentation should capture a continuous record of time-stamped A-weighted sound levels at intervals no greater than one second.
4	The system should have the ability to record high-quality audio tape recordings at periodic intervals for subsequent spectral analyses (minimum frequency range of 50 to 10,000 Hz), with an equivalent electrical noise floor at or below the human threshold of hearing (at least up to 3,000 - 4,000 Hz).
5	An independent sound source audibility log should be maintained by a human observer throughout each day's measurement period in order to determine the length of time aircraft sounds are audible, as well as to interpret the source measured sound levels on a moment-to-moment basis.
6	Each human observer should be audiometrically screened prior to field data collection to determine that they have normal hearing thresholds.
7	Wind monitoring equipment should be installed to assist in data interpretation.

Approach to Instrumentation

To meet the requirements of Table 5.1, the single measurement site had four (and occasionally five) simultaneous data acquisition activities in progress: (1) continuous sound level monitoring, maintaining a history of sound levels sampled at 1-second intervals, (2) periodic digital audio tape recording, obtaining periodic samples of the sound environment at the site, (3) continuous observer logging, obtaining a continuous log of all audible aircraft and non-aircraft sounds,(4) continuous wind monitoring, maintaining a continuous history of wind speed and direction sampled at 2-second intervals, and 5) photography of aircraft at point of closest approach to the site. All data acquisition instruments had clocks recording time-of-day to the nearest second and these clocks were all time-synchronized to the nearest second at the beginning of each measurement day.

One sound level monitor was employed at the measurement site. The monitor uses a high-quality, low-noise microphone system capable of measuring sound levels down to the human threshold of hearing.

Wind can raise the overall measurement system noise floor, making the measurement of low sound level aircraft and low level ambient environments difficult. The phenomenon of wind-induced microphone noise (functional requirement #2) was also addressed. In an unprotected microphone, wind blowing across the microphone diaphragm results in large pressure fluctuations that produce sound level readings considerably higher than other clearly audible sounds.

Under typical suburban background sound level conditions, a 3½-inch diameter, open cell foam windscreen is sufficient to protect the microphone so that winds under 10 miles per hour will not interfere with sound level measurements. Under lower background sound level or higher wind speed conditions, however, more aggressive actions must be taken to reduce wind-induced noise. The strategy used in earlier NPS studies employed a conventional tripod-mounted microphone with a *two-stage* windscreen consisting of a 20-inch diameter fabric windscreen surrounding the conventional 3½-inch diameter foam windscreen. Studies have shown that increasing the windscreen diameter reduces wind-induced microphone noise, and the specially designed large NPS-type windscreen was used for sound monitoring in this study.

Staffing

The data acquisition site was staffed by two acousticians, one with in-depth experience in the data collection procedures used for the previous NPS work (described in Anderson, *et al*, footnote 2), the other a junior level acoustician. The nature of the site required, partly for safety reasons, that two people be available. Lack of shade and the potentially intense sunshine reflected by the white sands all mean that one person should not be expected to spend more than about two hours without break, collecting data. Data collection required continuous intense concentration identifying in a computer log each change in the sound environment as well as photographing each aircraft overflight at the appropriate instant. Because continuous data are necessary if all potential interviewee's sound exposures are to be accurately quantified, the acquisition must be uninterrupted and the two staff are necessary to spell each other. These two staff were responsible for carrying data collection equipment to the site, setting up the equipment, maintaining the aircraft observer log, and photographing aircraft.

5.2.2 Acoustic Instrumentation and Procedure

The purpose of the acoustic data acquisition system was to collect a continuous, uninterrupted time history of A-weighted sound levels from which acoustic doses were determined for any specified time interval. Functional requirements of the instrumentation included (1) the ability to measure, time-stamp and store A-weighted sound levels acquired at 1-second intervals over a 6 to 9 hour data collection period, (2) the ability to download this information to an IBM-PC compatible computer in machine-readable form, (3) an instrumentation noise floor very near or below the human threshold of hearing, (4) minimal weight, and (5) battery power operation.

Instrumentation

The instrumentation used to meet these requirements consisted of low noise components with an end-to-end A-weighted sound level noise floor of 2 decibels. The instrument chain was a Brüel & Kjaer (B&K) Model 4179, 1-inch diameter low-noise condenser microphone, a B&K Model 2660 microphone preamplifier, a B&K Model 2804 power supply[17], and a Larson-Davis Model 870 Precision Integrating Sound Level Meter. This complete instrumentation package is generically referred to elsewhere in the text as a "sound level monitor" or "sound monitor." The entire system was calibrated at the beginning and end of each day's measurement session using an acoustic calibrator[18]. A schematic diagram of the instrumentation is shown in Figure 5.1.

The microphone was protected from wind and foreign material with a 2-stage windscreen. The inner windscreen was a B&K Model UA0207 3½-inch diameter, open cellular foam windscreen. The outer windscreen is the custom designed and fabricated 20-inch diameter sphere consisting of 32, 1/16th-inch diameter semi-circular ribs covered with tightly fitting Spandex fabric. This complete system is described in detail in Appendix A of Anderson, *et al.*

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[17] This power supply was custom-modified by the manufacturer to operate completely from battery power.

[18] Calibrators are traceable to the United States National Institute of Standards and Technology (NIST). The sea level reference sound level of each calibrator was adjusted for measurement site altitude using manufacturer supplied curves.

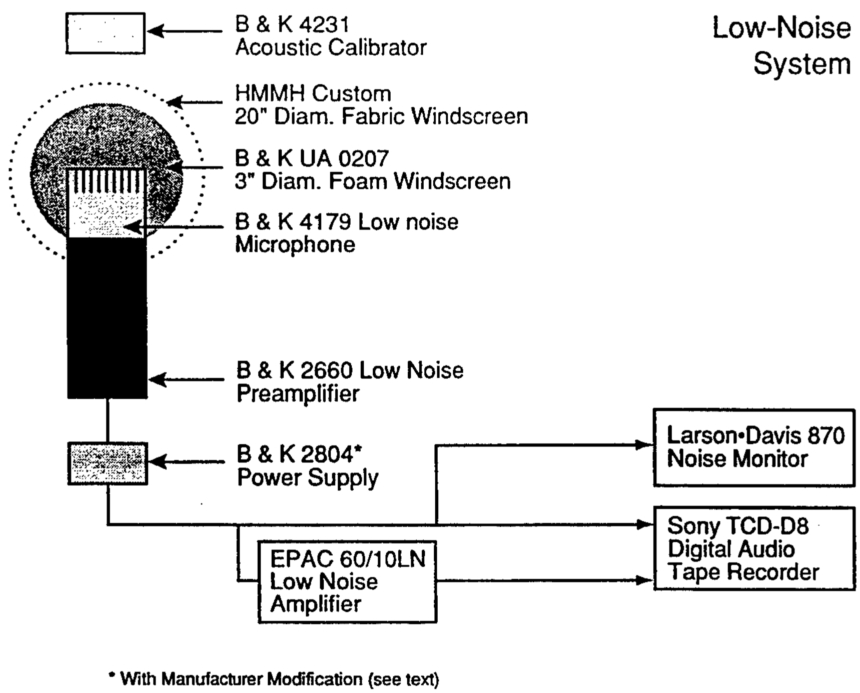

Figure 5.1. Schematic Diagram of Acoustic Data Acquisition System

Tape recordings were made of the noise environment using an EPAC Model 60/10LN low-noise preamplifier and Sony TCD D-10PRO 2-channel digital audio tape recorder. One channel of the recorder was a direct input from the microphone preamplifier and the recording gain adjusted so that a maximum sound level of 95 decibels from a random noise source could be recorded. The other channel recorded the same data, but with 20 to 30 decibels of gain (depending on measurement site conditions) introduced by the EPAC low-noise amplifier. This channel thus had a lower maximum sound level capability than the other channel, and was therefore be capable of measuring sound levels below the human threshold of hearing up to about 4000 Hz.

Wind conditions were documented using an R.M. Young Model 5305 wind monitor mounted atop a 6 foot tripod. The sensor provides both speed and direction outputs, and has a wind threshold starting speed of 0.9 miles per hour. The vane orients within 5 degrees of true wind heading in winds of only 1.6 miles per hour. The two outputs from the sensor are connected to an R.M. Young signal conditioner, and the outputs of the signal conditioner are connected to two channels of a Remote Measurement Systems, Inc. Model ADC-1 Analog-to-Digital converter. This battery powered converter provides an RS-232 output which was connected to a battery powered laptop computer. The computer sampled the voltages from the sensor every 2 seconds and stores the readings directly on floppy disk. All system components were powered from a single 12-volt battery.

Procedure

As discussed earlier, the monitoring location at the site was chosen jointly by HMMH and National Park Service personnel. The selected location struck a balance among several goals: instrument security, unobtrusiveness to visitors on the trail, accurate measurement of aircraft overflight sound, accurate measurement of non-aircraft sound, and visibility of aircraft for photographing purposes.

The microphone was located over 100 feet from the nearest portion of the trail. This strategy satisfies the security and unobtrusiveness goals. Visitors were able to see the instrumentation at only one small portion of the trail, and this at the last section of the walk only. The microphone was located a sufficient distance from the parking lot to avoid attracting attention and so that vehicle noise had very little effect on measurements.

The microphone and windscreen were tripod-mounted with the microphone axis aligned vertically (with diaphragm parallel to the ground) and approximately 5 feet above ground level. The microphone preamplifier and power supply were placed at the base of the tripod and connected by 75 to 100 feet of cable to the precision integrating sound level monitor where the aircraft observer was located. This large distance between microphone and observer is required due to the extremely low sound levels at the site: it ensures that the person operating the equipment and maintaining the aircraft observer log can move about and conduct minimal conversation (albeit in low whispers), without influencing the measured sound levels.

The sound level monitor contained 256kbytes of memory, sufficient for about one-and-a-half days of one second samples. The monitor was programmed to collect a continuous time series of 1-second A-weighted equivalent sound levels (in decibels). At the end of each measurement period the sound level time history stored in the sound level monitor was downloaded to an IBM-compatible personal computer and saved as a text file for later processing.

Deploying and calibrating the sound level monitor was the first task of the day. After deployment, the first step in the calibration process was ensuring that the sound level monitor's clock read within 1 second of the previously-calibrated wristwatch. The second step was an acoustic calibration. The calibrator used, a B&K Type 4231, is unaffected by altitude changes, so no adjustments to the calibration for altitude were required.

The sound level monitor ran continuously throughout the day and was not be stopped until after the last survey interview of the day was underway. At that point, data collection was stopped and an acoustic check-calibration performed. The monitor's clock was also be inspected to document any drift from the reference watch (drifts rarely exceed 1 second). The unit was then be turned off (an internal battery retained memory) and the equipment packed up. Later in the evening, the data were downloaded from the sound level monitor to a personal computer, the data files copied to floppy disk, and duplicate disks made as a safeguard against data loss.

The wind monitor was deployed after the monitor. With this equipment operational, the aircraft observer logging commenced. Since the wind monitor system writes data directly to a 3½-inch floppy disk, the end-of-day procedure involved only the securing of the equipment and making a backup copy of the wind data file.

5.2.3 Aircraft Observer Log Instrumentation and Procedure

The purpose of the aircraft observer log was to maintain a continuous, chronological record of sound source audibility during (and time-synchronized with) sound level data acquisition. Functional requirements of the process included (1) overall reliability, (2) the ability to maintain accurate, time-stamped records of changes in the acoustic environment, (3) consistency across sites in the method of categorizing sound sources, (4) the ability to correct mistakes, (5) minimal weight, and (6) minimal labor required to reduce the data to machine-readable form. The approach that meets these requirements was a computer-aided method in which data were entered directly into a portable computer, utilizing the computer's on-board system clock to assure time-synchronization.

Instrumentation

The instrumentation consisted of a POQET brand IBM-PC compatible, palmtop computer weighing less than 2 pounds and operating on two AA-size batteries. The computer ran a spreadsheet program containing the basic log form and macro-driven logging functions.

Procedure

For the purposes of this study the acoustic environment was divided into 3 states:

- "Aircraft"
- "Non-Aircraft - Human" (Human Related Non-Aircraft)
- "Non-Aircraft - Natural" (Park Indigenous or "Natural" Non-Aircraft)

The primary function of the log was to document the acoustic state of the measurement site at any instant in time. The secondary function was to identify specific audible sources contributing to the acoustic state. Since two observers were involved in the field data collection task, it was critical for both to use a simple, consistent approach to this task.

The observer used the above 3 categories in the form of a simple audibility hierarchy. If sounds from more than one category were simultaneously present, the observer logged only the highest applicable category in the list. For example, if the sound of an automobile and an aircraft can be heard at the same time, the observer logs "Aircraft." If the sounds of an automobile and rushing water are simultaneously audible, the observer logs "Non-Aircraft - Human." The only times "Non-Aircraft - Natural" will appear in the log will be when no man-made sounds of any kind are audible.

A macro-driven spreadsheet was used to maintain a consistent, continuous, time-stamped record of source contributors to the acoustic environment. The spreadsheet was been designed to resemble a hardcopy log, with the site and date entered at the top of the form, and acoustic state changes entered in chronological order in the rows below.

Figure 5.2 shows an example of a log completed for a previous study at a different National Park. The left-most column of the log shows the time (hours:minutes:seconds) when some element of the acoustic state changed. The column immediately to the right identifies the new acoustic state entered. The additional columns to the right provide detailed source information about the acoustic state. The first four of these columns provide information about aircraft sources: the aircraft type, the number of engines, the aircraft altitude (categorized as low, medium, or high), and an aircraft operator category. Further to the right is a background type column for identifying specific background sources. The rightmost column provides space to enter comments.

The log indicates that only the natural sound of the wind was audible at 10:58:30 ("Wind/Ear" is the log abbreviation for wind noise in the ear). At 11:01:19 the human-related sound of a motor vehicle (tour bus) became audible. At the beginning of vehicle audibility, and perhaps throughout the passby, the sound of the wind was still audible. However, the priority structure dictated that "Human" took precedence over "Natural" and the acoustic state was categorized as human-related until 11:02:51 when the motor vehicle ceased to be audible and only the natural sound of the wind remained. At 11:03:50 a second vehicle became audible (idling car), and remained so until 11:06:05. The "Natural" state continued (wind in the ears) until 11:06:47 when an aircraft became audible. Had another motor vehicle become audible between 11:06:47 and 11:10:29 the logged acoustic state would not have been changed since human-related background was of lower rank than aircraft.

Time	Acoustic State	A/C Type	Num Eng	A/C Alt	A/C Oper	Backgnd Type	Comments
10:46:16	Beg Log	***	***	***	***	***	
10:46:23	Human	***	***	***	***	Vehicle	WATER TRUCK ON THE ROAD
10:47:04	Natural	***	***	***	***	Wind/Ear	
10:50:43	Human	***	***	***	***	Vehicle	
10:50:57	Natural	***	***	***	***	Wind/Ear	
10:54:16	Human	***	***	***	***	Vehicle	
10:54:41	Natural	***	***	***	***	Wind/Ear	
10:55:58	Human	***	***	***	***	Vehicle	
10:56:16	Natural	***	***	***	***	Wind/Ear	
10:58:12	Human	***	***	***	***	Other	CAR DOORS
10:58:30	Natural	***	***	***	***	Wind/Ear	
11:01:19	Human	***	***	***	***	Vehicle	TOUR BUS
11:02:51	Natural	***	***	***	***	Wind/Ear	
11:03:50	Human	***	***	***	***	Vehicle	IDLING CAR
11:06:05	Natural	***	***	***	***	Wind/Ear	
11:06:47	Aircraft	Helo		Med	Tour	***	HDNG W A LITTLE S OF THE SMALL CRATER
11:10:29	Human	***	***	***	***	Vehicle	
11:11:44	Natural	***	***	***	***	Wind/Ear	
11:11:57	Human	***	***	***	***	Vehicle	
11:12:06	Natural	***	***	***	***	Wind/Ear	
11:13:01	Human	***	***	***	***	Vehicle	
11:14:18	Natural	***	***	***	***	Wind/Ear	
11:16:55	Human	***	***	Hi	***	Vehicle	TOUR BUS PARK W/ENGINE RUNNING
11:18:05	Human	***	***	***	***	Vehicle	TOUR BUS ACCELERATING
11:19:44	Natural	***	***	***	***	Wind/Ear	
11:24:44	Aircraft	Helo		Med	Tour	***	HDNG E ABOUT 200 YARDS FROM THE MIC
11:28:37	Natural	***	***	***	***	Wind/Ear	
11:28:50	Aircraft	Prop		Med		***	DISTANT - CIRCLING THE CRATER
11:29:46							C
11:30:06							U
11:35:29	Human	***	***	***	***	Vehicle	
11:36:00	Natural	***	***	***	***	Wind/Ear	
11:36:12	Human	***	***	***	***	Vehicle	
11:36:41	Natural	***	***	***	***	Wind/Ear	
11:39:19	Human	***	***	***	***	Vehicle	
11:39:29	Natural	***	***	***	***	Wind/Ear	
11:40:57	Human	***	***	***	***	Vehicle	
11:41:22	Natural	***	***	***	***	Wind/Ear	
11:47:05	Human	***	***	***	***	Vehicle	TOUR BUS ACCELERATING
11:49:15	Human	***	***	***	***	Vehicle	TOUR BUS W/MOTOR RUNNING
11:53:10	Aircraft	Prop	1			***	HDNG S
11:55:03	Human	***	***	***	***	Vehicle	TOUR BUS ACCELERATING - 4 BUSES AT TH
11:56:41	Human	***	***	***	***	Vehicle	3 BUSES W/MOTORS RUNNING
11:59:54	Aircraft	Helo		Med	Tour	***	HDNG W
12:03:23	Human	***	***	***	***	Vehicle	SAME 3 BUSES W/MOTORS RUNNING
12:06:09	Human	***	***	***	***	Vehicle	BUSES ACCELERATING
12:08:27	Natural	***	***	***	***	Wind/Ear	
12:10:10	Human	***	***	***	***	Vehicle	

Figure 5.2. Sample Aircraft Observer Log

One approach to maintaining the log would have been to have the observer type the information into the spreadsheet by hand. This approach was discarded, however, because it would have been time-consuming, prone to error during rapidly changing acoustic environments, and would not have provided consistent descriptions of the sound environment across sites. Instead, a menu of fixed choices was developed. These choices are shown in Table 5.2. To facilitate data entry, each choice in the table was assigned to a key on the computer keyboard as shown in Figure 5.3. Labels were attached to the keys, and color coded by the column groupings shown in the table. Each key had a spreadsheet macro associated with it (a macro is a set of spreadsheet instructions which can be executed very rapidly) that filled in the appropriate information in the log.

Table 5.2. Aircraft Observer Log Sound Source Categories

Aircraft			Non-Aircraft	Non-Aircraft
Type	Operator	Altitude	Human	Natural
Don't Know	Tour	Low	Vehicle	Wind in the Ear
Jet	Commercial	Medium	Voice	Wind in Foliage
Propeller	General Aviation	High	Animal (domestic)	Water
Helicopter	Military		Other	Animal
				Other
				None

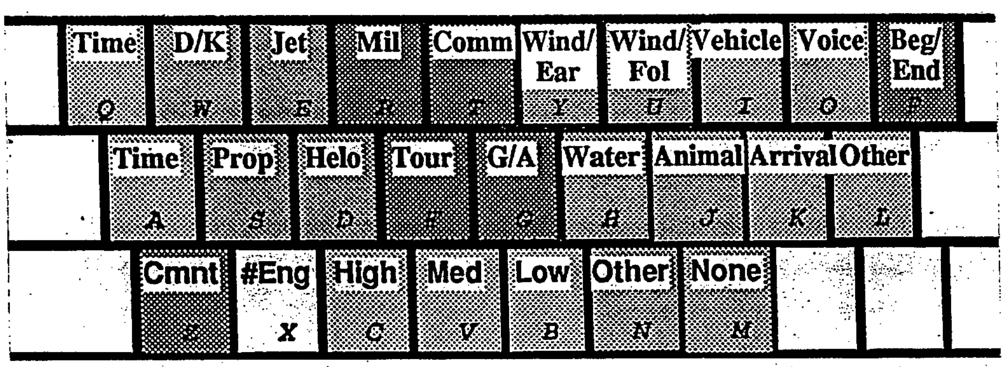

Figure 5.3. Keyboard Layout of Sound Source Logging Computer

Logging personnel devoted their full attention to listening for different sound sources, and based on their observations identify which of the three acoustic states was in effect. When something about the acoustic environment *changed*, the observer pressed the "Time" key (<Alt>-Q). The underlying macro entered the time-of-day as the next entry in the log. If there was no change after listening further, then no additional information was entered on that line of the log (and the line is subsequently ignored during data reduction). If a change did indeed occur, then additional keys were pressed to describe the new acoustic state.

If the new state was a non-aircraft background state, then only two keystrokes (<Alt> plus the appropriate background key) were required. When one of these keys was pressed, the macro wrote "Human" or "Natural" in the Acoustic State column, and then the predominant source in the Background Type column. If a mistake was made, the observer simply pressed another key and the data from the first keystroke was overwritten.

If the new state was another aircraft becoming audible, the observer pressed one of the four Aircraft Type keys. The macro then wrote the word "Aircraft" in the Acoustic State column and the selected aircraft type in the A/C Type column. If it was possible to ascertain the additional attributes about the aircraft, these were entered with further keystrokes. For the number of engines, the macro prompted the observer for a single digit number. For aircraft altitude, a subjective assessment using a 3-point category scale of "Low", "Med" or "High" was sought. For aircraft operator, one of the four choices in Table 5.2 was entered. The macros placed the selected descriptors in the appropriate columns of the spreadsheet. Error correction was performed by simply pressing another key and overwriting the original data.

The spreadsheet approach maximizes both timing and source identification accuracy. By separating the time-stamping function from source identification, the onset of aircraft audibility can be accurately established before source classification details are known, especially those requiring visual confirmation. Furthermore, if a second aircraft becomes audible before all the source characteristics of the first are known, a new time stamp can immediately be entered for this aircraft. The spreadsheet cursor can then be moved back to the preceding entry to enter additional information about the first aircraft, and then moved back to the last entry to enter information about its characteristics.

Time synchronization was achieved by setting the POQET's system clock to read within 1 second of the sound level monitor clock at the beginning of the logging period. Clocks were compared periodically throughout the day to track any drift. At the end of each day's measurement period the data were saved as a worksheet file as well as an ASCII text file. Copies of these files were then made to ensure against data loss.

5.3 Survey Data Collection

The survey data collection provides visitor responses to the aircraft they experienced during their visit to the study area. The survey was administered during an on-site group interview with selected groups of visitors. The group interviews were conducted by a team of trained interviewers and supervisors. The goal of the dose-response survey data collection was to complete interviews with 200 to 300 visitors for whom an acoustic dose could also be calculated corresponding to the time of the visit. To insure that the questions are understood, interviews were conducted with only visitors 16 years of age or older, who were judged to understand english well.

The survey research team also recorded the precise time that each group of visitors arrived at the area (the beginning of their exposure to aircraft overflights at that site) and the precise time at which they were intercepted by an interviewer as they left the area. These two times, marking the beginning and end of their visit to a specific study area, were used to calculate the acoustic dose that each visitor received at that site.

5.3.1 Survey Instrument

The dose-response survey instrument was designed in consultation with USAF and NPS personnel and approved by the Office of Management and Budget (OMB). The survey instrument was designed to be administered on-site as visitors were leaving the study area. Thus, the number of questions was limited to the minimum set required for the dose-response analysis. The survey instrument consisted of 15 questions, including 3 questions on the current visit and prior experience at the park and at the site, 4 questions evaluating the current visit in general terms, 5 questions asking about hearing and seeing aircraft during the visitor's time at the study site, one question on type of aircraft heard or seen, one asking about hearing or seeing information about aircraft, and one final open-ended question for any other comments.

In addition to the survey questions, interviewers recorded several measures of group characteristics by observation. These additional group measures were recorded on an Observation Form (see Appendix C of Attachment 1), and on a Cover Sheet by the interviewer during the course of the interview (Appendix D of Attachment 1). The group measures included the time of arrival at the study area, the type of park (natural, cultural, or other), the name of the study area at which the survey was conducted, the type of site (frontcountry or backcountry), self-reported time of arrival at the park, the time at which the group was intercepted to administer the survey, and several characteristics of the group. The complete survey instrument can be found in Appendix A.

The survey generally took less than 10 minutes to administer. Because many people do not visit parks alone, the survey was designed to be administered to a group so that answers could be obtained independently from each person in the group. Using this procedure, all eligible adults in the group were asked to participate. All participating members of the group were given an answer sheet on which to record their answers to the survey questions. The interviewer read the questions aloud to the group and asked each participant to record his or her answers without discussing them with other group members until the interview was completed.

Survey answer sheets were then collected from all participating group members and attached to the cover sheet containing the observed information for that group. This procedure was used to include the additional group data in the record of each respondent during data processing, so that selected group level variables can also be used in the dose-response analysis.

5.3.2 On-Site Sampling Strategy

Interviews were conducted each week day, generally between 0800 and 1530. Times varied depending upon the timing of aircraft overflights, weather (rain) and missile tests at the test range. Most visitors arrived by automobile and parked in the lot. One person observed arrival times for each group and logged the time and identifying characteristics of the group. This person also tracked overflight times so that groups that could have heard aircraft can be identified. As each group that could have heard aircraft prepared to leave, the observer informed the interviewer of the group's arrival time, and the group was intercepted and asked to participate. A few preliminary questions permitted the interviewer to determine whether the members of the group understood english well enough to participate. Because of the need to acquire the maximum number of interviews, the attempt was made to interview every group that was present during an aircraft overflight. Of 194 groups eligible, 8 refused to participate, one was missed and one was judged to have a language barrier. From the remaining 184 groups, a total of 381 individual interviews were conducted, of which 349 were useful for analysis, see Section 7. (A more complete discussion of the survey methods and summary results is presented as Attachment 1, which follows Appendix F.)

6. DATA REDUCTION

In this phase of the project, the field data were processed to produce database files containing all the acoustic dose variables and all of the survey response variables for each respondent. This database became the input to the data analysis phase described in Section 7 and in Appendix B. Figure 6.1 provides an overview of the process in which the three input data types (the acoustic time history, the aircraft observer log, and the survey demographic and response data) are prepared and then merged by a single computer program to generate the dose-response. Hence, for a single measurement day, one sound level time-history file, one observer log file, and one survey file provide the required data as input. Additionally, data that quantify the slant distance from the aircraft to the site (microphone) were included for analysis, as was specific identification of whether each aircraft flew over the site (was and "overflight"), or was a distant aircraft, only heard and not seen (see discussion of Section 7.3.3).

The dose-response database generation program can process one day's data at a time and builds the database by consecutively processing each day's data until all the data have been processed. This entire computation task is assembled as a batch process to facilitate any subsequent reprocessing of the data.

Section 6.1 describes the preparation of acoustic data (sound level and aircraft observer log) prior to database generation. Section 6.2 describes the preparation of survey data. Section 6.3 describes the processing of these data to create the database. The details of the dose metric calculations are also discussed in Section 6.3.

6.1 Acoustic Data Reduction

In this task the sound level and observer log data files were reviewed and reformatted as needed for input to the dose-response database preparation program.

6.1.1 Sound Level Data

As shown in Figure 6.1, the A-weighted sound level time history data acquired by the sound level monitors at 1-second intervals was downloaded in the field via an IBM-PC compatible personal computer to floppy disk files. These files were subsequently input to the dose-response database preparation software without further processing.

Supplementing these sound level files was a site-specific sound level adjustment. This adjustment accounted for the additional gain introduced in the field by the high-gain preamplifiers (for which the LD-870 could not numerically compensate). This adjustment was a single term which was arithmetically added to the sound levels in the time history files.

6.1.2 Aircraft Observer Log Cleaning and Formatting

Figure 6.1 shows the "cleaning and formatting" task between the data files acquired in the field and the input files to the dose-response computation program. In this task, the observer log spreadsheet files were reviewed to ensure that the data acquisition site and date were correct (the site and date were also used to form the file name, which served as a cross-check), that the logging start and stop times were properly documented, and that all data entries were in chronological order. The spreadsheet was then output as an ASCII text file that served as input to the dose-response database preparation program.

6.2 Survey Data Reduction

Survey data reduction consisted of survey editing, data processing, and data cleaning. Each of these steps is described in the following sub-sections.

6.2.1 Survey Editing and Data Entry

Completed dose-response survey forms were shipped back to Hagler Bailly offices in Madison, WI for data processing. Survey editing was the first step in this process. The survey data processing staff examined each of the answer sheet forms for completeness, resolved any internally inconsistent responses and coded all open-ended questions. The survey editors follow a standardized set of rules for resolving any internal inconsistencies in an answer sheet; such ambiguities as circling two different response categories or writing in a response rather than selecting one of the response categories that were provided are resolved. For open-ended questions, the survey editor coded approximately 100 completed questionnaires and, based upon the responses encountered, worked with a survey research supervisor to develop a formal coding scheme.

Edited survey answer sheets were checked for accuracy and consistency by a survey research supervisor before they were sent to data entry. In data entry, all of the edited survey answer sheets were keyed into machine-readable form and then verified by data entry staff.

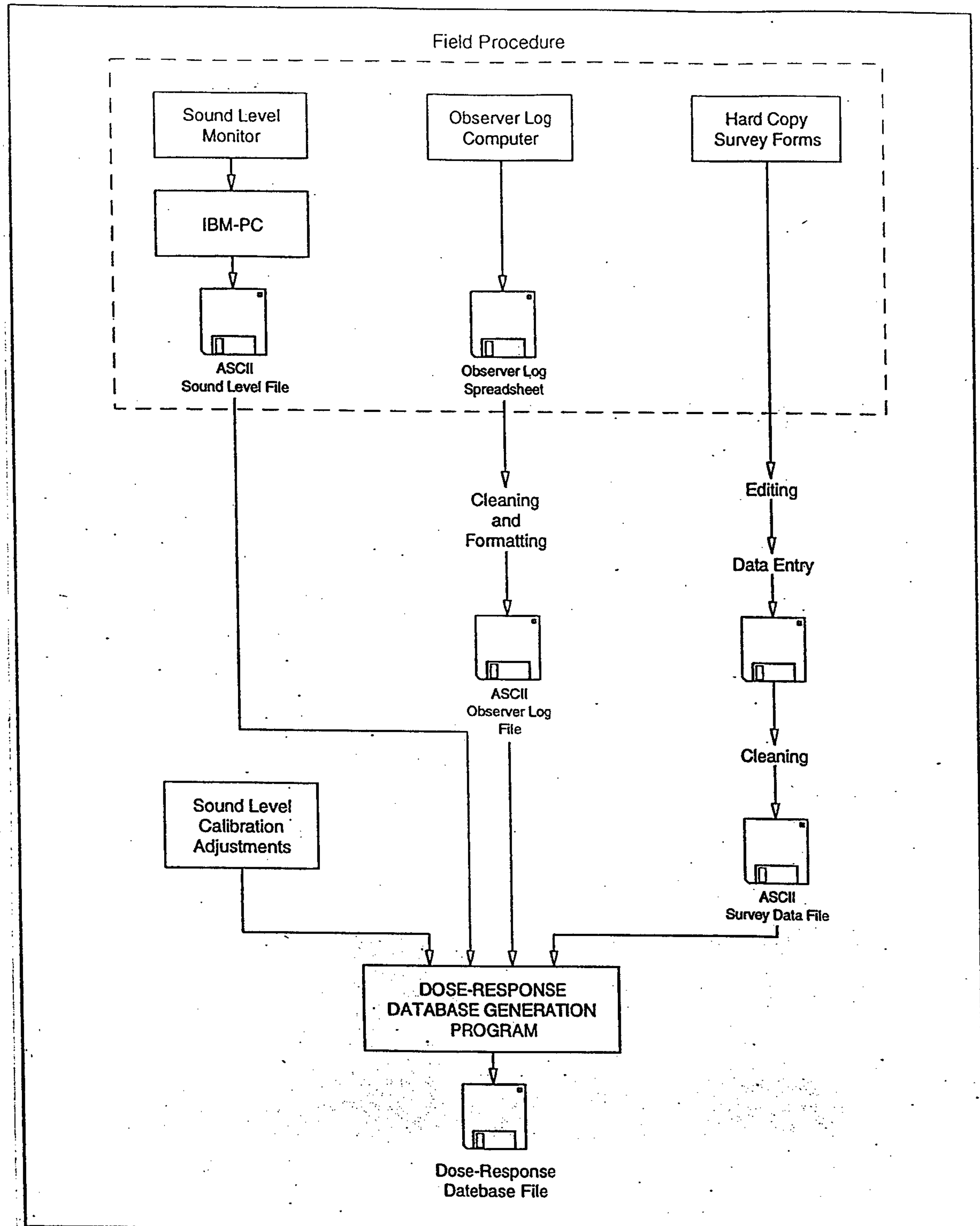

Figure 6.1. Overview of Dose/Response Data Reduction

6.2.2 Survey Data Cleaning

After the survey data file was entered and verified, the data were checked to prepare them for analysis. Data checking uses an electronic data checking program to scan each respondent record for the correct skip patterns, out-of-range codes, and other data quality indicators. Any discrepancies are checked and resolved by a survey research supervisor and the project manager who is assigned responsibility for any data analysis and reporting. After the data processing and cleaning were completed, the survey data file and the documentation were shipped to HMMH for dose calculations and combining doses and responses into a single database.

6.3 Calculating Respondent Doses and Combining with Responses

A single computer program was written to calculate the dose metrics for each respondent and combine them with the respondent's demographic information and survey responses into a single database file. The relationship between the input data, the program, and the database output was shown earlier in Figure 6.1. This dose-response database generation program processes one day's data at a time, building up the database with each successive day's data until the data from all study areas has been processed.

The overall computational procedure is driven by the survey data file. For each respondent, the program performed the three-step process shown schematically in Figure 6.2. In step 1, the respondent's arrival time at the study area and the time the interview began are extracted from the survey file. These "begin" and "end" times define the limits of the respondents visit to the study area, and are used to identify the corresponding portions of the aircraft observer log and sound level time history files from which the doses were calculated. In step 2, the identified portions of the observer log and the sound level time history files are used to compute the dose metrics under study. In step 3, the computed doses along with the respondent's demographic and response data are written as a single record in the dose-response database file.

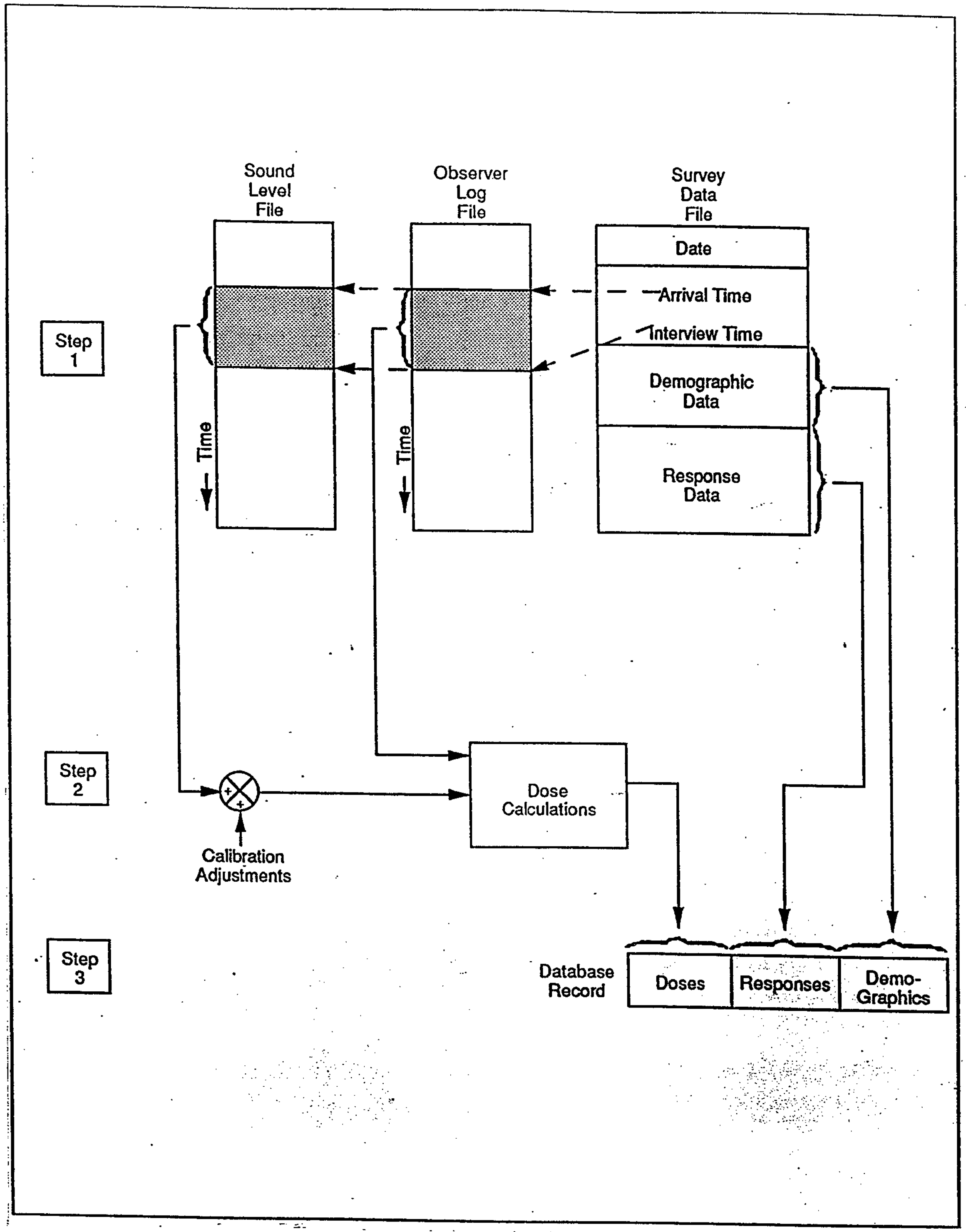

Figure 6.2. Overview of Dose/Response Database Generation

Using the arrival or "begin" and interview or "end" times of the respondent's visit, the time-synchronized sound level and aircraft observer log files are searched to ensure that continuous, uninterrupted data are available from both files over the specified time frame. If this is not the case, doses can not be computed and the interview will not included in the analysis. Next, the observer log is used to classify portions of the sound level time history into two primary acoustic states: *aircraft audible* and *aircraft not audible.* Figure 6.3 shows this process in graphical form. Cross-hatched shading is used in this figure to identify periods in the sound level time history when one or more aircraft were audible to the observer. The cross-hatched areas are referred to as aircraft sound events. An aircraft sound event can result from just one aircraft passby, as illustrated in the rightmost shaded area of the figure. An aircraft sound event can also result from more than one aircraft as illustrated in the center shaded area. In the situation illustrated, a new aircraft became audible before the preceding one became inaudible.

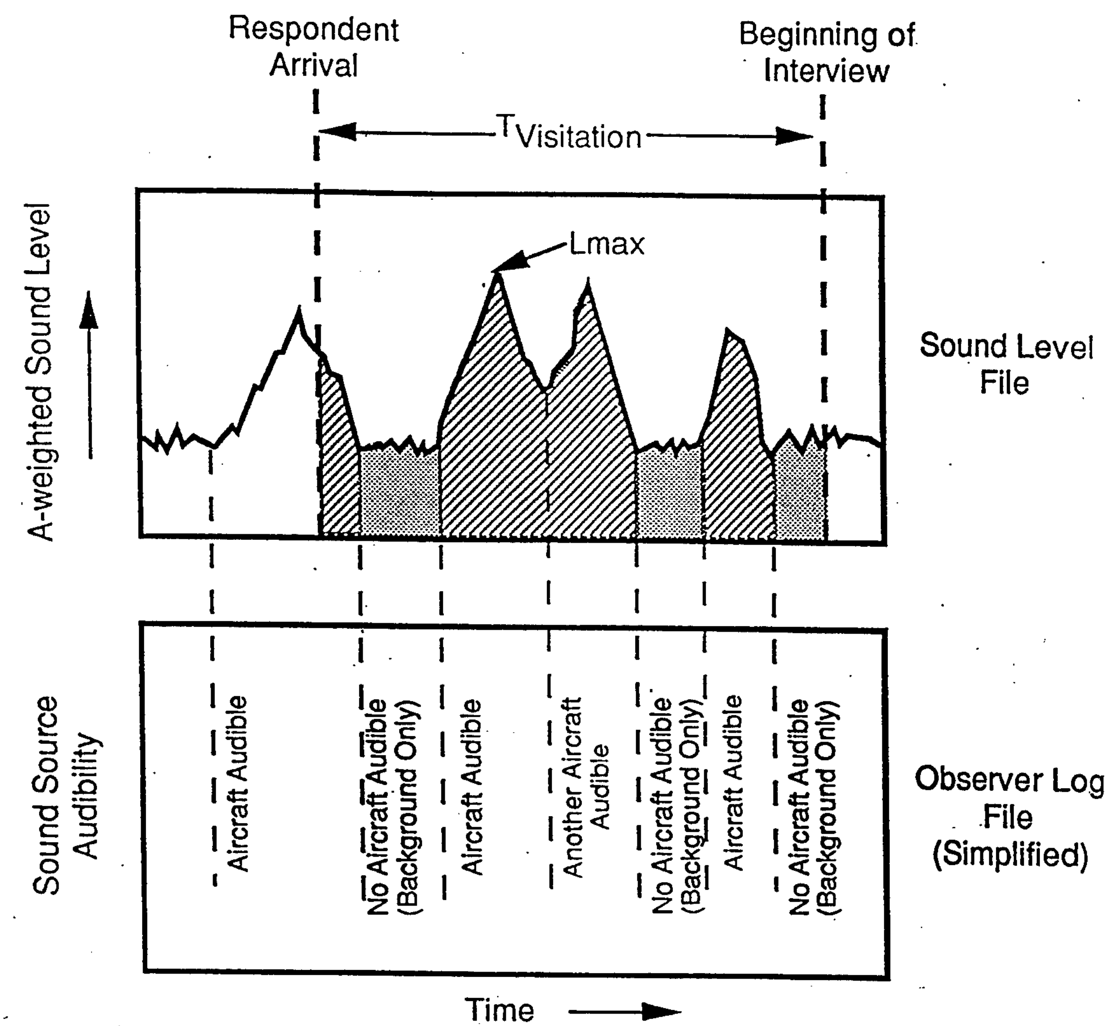

Figure 6.3. Dose Calculation Methodology

Percentage of Time Aircraft Can Be Heard

The percentage of time aircraft can be heard is defined as the percentage of the visitor's time in the study area (the visitation interval) during which the aircraft observer recorded aircraft as being audible. In Figure 6.3, this is the sum of all the shaded time intervals divided by the total visit duration, $T_{Visitation}$, multiplied by 100. In the Figure 6.3 example, the visitor arrived sometime after the beginning of the leftmost aircraft sound event. In such circumstances, only the portion of the event contained within the visitation interval was counted. Similarly, if the interview began during a sound event, only the portion up to the beginning of the interview would be counted. Calculation of this metric requires information from only the observer log.

Aircraft Sound Exposure Level, SEL

For the purposes of this study, the aircraft sound exposure level, abbreviated SEL, is defined as the summation of all the A-weighted aircraft sound energy during the visitation interval. In this discussion, this quantity is referred to as the *total* aircraft SEL. In the example of Figure 6.3, the sound energy from all 3 of the shaded aircraft sound events would be included. Mathematically, the result would be the same if the total aircraft SEL were calculated in one pass from all the shaded time intervals, or if individual SELs were computed for each aircraft sound event and then energy summed to obtain a total. For reasons described in the following paragraphs, it is computationally more convenient to adopt the latter approach and consider one sound event at a time.

Because of the potentially low aircraft sound levels during some visitor stays, one concern in this study was the influence of ambient sound levels on measured aircraft sound levels. For example, in many measurement situations, the maximum A-weighted sound level of a passing aircraft exceeded the ambient sound level by 20 decibels or more. In these cases the additive effect of the underlying ambient sound levels on the computed aircraft SEL are negligible (less than 1 decibel). However, on occasion, maximum aircraft sound levels could never exceed the ambient by more than 10 decibels. This type of environment is not uncommon for visitors who are exposed to the sounds of distant aircraft. In such situations, the measured A-weighted sound levels during significant portions of aircraft sound events could include significant contributions from both the aircraft and ambient sources. To minimize this potential bias, a three-step procedure is used to calculate the total aircraft SEL for each visitor: (1) calculate the composite SEL (aircraft plus ambient) during each period of aircraft audibility, (2) estimate the ambient SEL during each of these periods as well, and (3) energy sum the composite SELs and then energy subtract the ambient SELs to obtain the total SEL of the aircraft alone. The mathematics of this procedure are presented in the following equations.

Using Equation 1, the composite SEL during a single period of aircraft audibility is calculated. The summation process shown in the equation is generically referred to as *energy* summation. It adds the anti-logarithms of the individual sound levels recorded by the sound level monitor at 1-second intervals (divided by 10). Once the summation is complete, the base 10 logarithm is taken, and this quantity multiplied by 10.

$$SEL_{Composite} = 10 \ Log_{10} \left(\sum_{t=t_1}^{t_2} 10^{L_A(t)/10} \ \Delta t \right) \qquad \mathbf{1}$$

where:

where:	$SEL_{Composite}$	= composite (aircraft plus ambient) sound exposure level during a single aircraft sound event,
	$L_A(t)$	= A-weighted sound level measured at time t,
	t	= discrete time variable, indexing 1 second at a time,
	Δt	= time interval between samples (1 second), and
	t_1 to t_2	= time interval of aircraft sound event.

Figure 6.4 provides a graphical aid and equations 2 and 3 show the mathematics used for calculating the estimated ambient sound contribution during a single aircraft sound event. In the figure, an aircraft sound event is shown emerging out of the ambient environment, rising to a maximum level, and then decaying back into the fluctuating ambient. The period of aircraft audibility (identified from the observer log) is shown with shading. The period of aircraft audibility extends from time T_1 to T_2.

The portions of the sound level time history on either side of the aircraft event, when no aircraft sounds are audible, provides a means for estimating the ambient sound levels that existed *during* the aircraft event. Using the observer log, the computer algorithm searches for 3 minutes of ambient sound environment on either side of the aircraft event. If no aircraft sound events are encountered within these two 3 minute intervals, the individual measured sound levels within these intervals are used to calculate an ambient energy equivalent sound level, Leq. If another aircraft sound event is encountered within one of the intervals, the algorithm skips around the event until it finds a total of 3 minutes of ambient sound, albeit temporally discontinuous. Under no circumstances did it search further than 10 minutes from the edge of aircraft sound event in question in its search for a total of 3 minutes of ambient sound. The mathematics used for this calculation are shown in Equation 2.

$$L_{eq,\ Ambient} = 10\ \mathrm{Log}_{10}\left(\frac{\sum_{t=t_1-180}^{t_1} 10^{L_A(t)/10}\,\Delta t + \sum_{t=t_2}^{t_2+180} 10^{L_A(t)/10}\,\Delta t}{D_1 + D_2} \right) \qquad 2$$

where:

$L_{eq,\ Ambient}$ = energy average ambient sound level during a single aircraft sound event,

$L_A(t)$ = A-weighted sound level measured at time t,

t = discrete time variable, indexing 1 second at a time,

Δt = time interval between samples (1 second),

t_1-180 = 3 minutes (180 seconds) before the aircraft event,

t_1 = beginning of the aircraft event,

t_2 = end of the aircraft event,

t_2+180 = 3 minutes (180 seconds) after the aircraft event,

D_1 = duration of usable ambient sound preceding the aircraft event (usually 180 seconds), and

D_2 = duration of usable ambient sound after the aircraft event (usually 180 seconds).

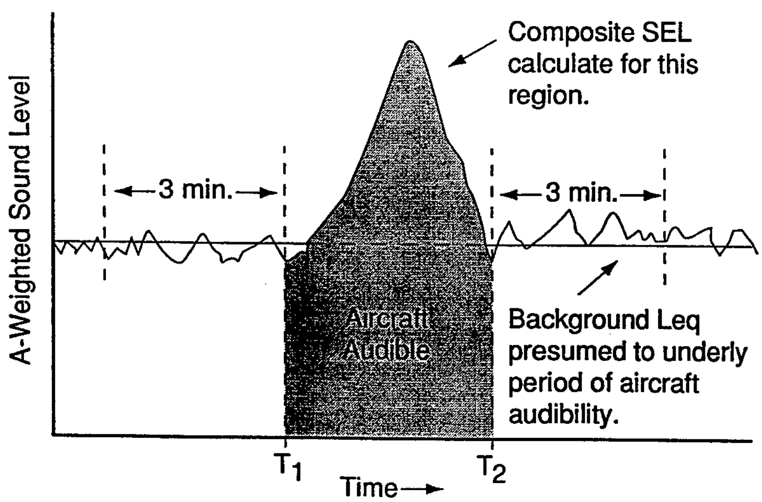

Figure 6.4. Aspects of Single Event Sound Level Calculations

It should be noted that this *ambient* sound level calculated for the purpose of aircraft sound level adjustment is intentionally temporally localized around each individual sound event. It is not meant to represent the *background* sound level as a whole experienced by the visitor during the entire visitation interval.

The estimated SEL contribution of the ambient during the aircraft event (of duration t_2-t_1) is calculated using Equation 3.

$$\mathrm{SEL}_{\text{Ambient}} = L_{\text{eq, Ambient}} + 10 \ \mathrm{Log}_{10} \ (t_2 - t_1) \qquad \mathbf{3}$$

where: $\mathrm{SEL}_{\text{Ambient}}$ = sound exposure level contribution from the ambient environment during a single aircraft sound event,
$L_{\text{eq, Ambient}}$ = energy average ambient sound level (from Eqn. 2),
t_1 = beginning of the aircraft event,
t_2 = end of the aircraft event.

Using Equation 4, the ambient SELs underlying the aircraft events were energy summed and then subtracted from the energy sum of the composite (aircraft plus ambient) SELs during aircraft sound events to calculate the total SEL of the aircraft alone.

$$\mathrm{SEL}_{\text{Aircraft}} = 10 \ \mathrm{Log}_{10} \left(\sum_{i=1}^{N} 10^{\mathrm{SEL}_{\text{Composite}}(i)/10} - \sum_{i=1}^{N} 10^{\mathrm{SEL}_{\text{Ambient}}(i)/10} \right) \qquad \mathbf{4}$$

where: $\mathrm{SEL}_{\text{Aircraft}}$ = total SEL of all aircraft sound events,
$\mathrm{SEL}_{\text{Composite}}(I)$ = composite (aircraft plus ambient) SEL for the i^{th} aircraft sound event (from Eqn. 1),
$\mathrm{SEL}_{\text{Ambient}}(I)$ = estimated ambient SEL during the i^{th} aircraft sound event (from Eqn. 3), and
N = number of aircraft sound events during the visitation interval.

Aircraft Equivalent Sound Level

This metric takes the aircraft sound exposure level as calculated in Equation 4 (all the sound energy compressed into a 1-second period) and spread it out uniformly over the entire visitation interval. The aircraft equivalent sound level has a numerically lower value than the SEL because it is an average, and the SEL is a sum.

$$L_{eq,\ Aircraft} = SEL_{Aircraft} - 10\ Log_{10}\ (T_{Visitation}) \qquad 5$$

where:

- $L_{eq,\ Aircraft}$ = energy average aircraft sound level over the entire visitation interval,
- $SEL_{Aircraft}$ = total aircraft SEL for the visitation interval (from Eqn. 4), and
- $T_{Visitation}$ = length of the visitation interval (in seconds),

Background Equivalent Sound Level, L_{eq}

The background equivalent sound level is defined as the energy average sound level during periods of the visitation interval when no aircraft were audible. These periods are shown in Figure 6.3. This metric is calculated using Equation 6. For the sake of clarity, the time subscripts in the equation correspond to the illustration in Figure 6.3. For sound environments where there is very little fluctuation in moment-to-moment sound levels, the L_{eq} is typically only 1 or 2 decibels higher than the arithmetic average sound level. Because of its definition, L_{eq} is always greater than the arithmetic average: the greater the fluctuations, the greater the difference from the average.

$$L_{eq,\ Background} = 10\ Log_{10} \left(\frac{\sum_{t=t_2}^{t_3} 10^{L_A(t)/10}\ \Delta t\ + \ ...\ + \sum_{t=t_M}^{t_N} 10^{L_A(t)/10}\ \Delta t}{(t_3 - t_2)\ +\ ...\ +\ (t_N - t_M)} \right) \qquad 6$$

where:

- $L_{eq,\ Background}$ = energy average background sound level during periods when no aircraft are audible,
- $L_A(t)$ = A-weighted sound level measured at time t,
- t = discrete time variable, indexing 1 second at a time,
- Δt = time interval between samples (1 second), and
- t_2 to t_3 = first background time interval between aircraft, and
- t_M to t_N = last background time interval.

Relative Sound Level, $L_{eq,Relative}$

This is the decibel metric that quantifies the difference between aircraft sound energy (adjusted for ambient level during aircraft sound event) and non-aircraft or background sound energy. It is computed directly from the quantities defined in Equation 5 and Equation 6:

$$L_{eq,\ Relative} = L_{eq,\ Aircraft} - L_{eq,\ Background} \qquad \mathbf{7}$$

7. DATA ANALYSIS AND RESULTS

7.1 Introduction

This section presents the results of the study, and does so with two primary objectives:

1. Present the results in a form that is understandable and useful to airspace and park managers;
2. Present the results in the context of the specific site and visitor characteristics.

The first objective makes the study pragmatic and of immediate value to the managers. The second objective supports the first by providing full descriptions of the specific site, the sound environment, and the visitors. These descriptions should help managers relate the results to the realities of the site conditions. The physical site is described in the following section in descriptive, qualitative terms, and Sections 7.3 and 7.4 respectively describe the sound environment and the visitors quantitatively. This quantitative description is intended to aid managers in developing a sense of how what they may experience "on the ground" relates to a numerical description of that experience.

Sections 7.5 and 7.6 describe, respectively, the metrics used to quantify the "dose" of aircraft noise and the visitor "response" to that dose. Section 7.7 provides an overview of the analysis method and presents a specific example of how that method is applied. Section 7.8 gives the detailed results.

7.2 Description of the Site

Big Dune Trail is located about 2½ miles from the entrance to White Sands National Monument, along a paved two lane park road which is accessed directly through the main gate from US Route 70, south of Alamagordo, NM. The marked trail is circular, it is completely out in the open over the dunes with one combined entry / exit point. Scattered vegetation exists, but the overall impression is one of vast expanses of dazzling white "sand". Human produced sounds, other than aircraft, are limited to vehicles on the road through the park, and traffic on US Route 70. Route 70 traffic can occasionally be audible depending upon wind and weather conditions. Signs at the entrance / exit point of the trail give information about the trail and Trail Guide pamphlets, contained in an enclosed box, are available to visitors and provide descriptions of points of interest along the trail. A paved parking lot provides space for about 14 automobiles.

7.3 Description of the Sound Environment

This section provides basic descriptions of sound metrics, and quantifies both the non-aircraft and the aircraft produced sound environments at Big Dune Trail as measured during the data collection period of 14 July to 25 July 1997.

7.3.1 Basic Sound Metrics

Two basic types of metrics are used in this analysis to quantify the sounds heard at Big Dune Trail: sound levels in decibels; and the more recently introduced "percent of time audible". The decibel metrics have been used to quantify sound levels in most analyses of noise over the past 30 years, while percent of time audible has more recently proved useful in quantifying and understanding the effects of sounds in recreational settings.

7.3.1.1 A-Weighted Sound Levels.

Sound levels are quantified in terms of "A-weighted" decibels, signified as dBA. The A-weighting mimics the response of human hearing, de-emphasizing low and very high frequencies in a manner similar to that of the human ear. For reference, when a human is in an environment where sound levels are about 20 dBA or lower, the sounds that become most noticeable are likely to be those produced by one's own respiration, circulation and digestive systems. To hear sounds below about 10 dBA, breathing must be shallow. At the other extreme, sounds over 90 to 100 dBA can cause people to cover their ears, and sounds approaching 120 dBA may be felt as a physical sensation or pain in the ear.

Sound levels between these extremes are more common. In quiet suburban locations, for example, nighttime sound levels generally will not be below 35 to 45 dBA. In these areas, lower sound levels can be found primarily indoors. Indoors, at night, with windows closed and no appliances running, suburban levels may be as low as 15 to 20 dBA. During the daytime, outdoor sound levels in suburban areas can be expected to be between 45 and 55 dBA if not near an arterial or interstate highway or an airport. Sound levels that approach 60 dBA may begin to interfere with conversations at normal voice levels, and a raised voice may become necessary to preserve communication as sound levels exceed 60 to 65 dBA.[19]

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19 It is informative that most standard, high quality, sound monitoring equipment used for measuring environmental noise will not accurately measure levels below about 20 dBA.

Primarily one type of A-weighted sound levels are used in this analysis: the equivalent level, abbreviated L_{eq}. This is the level that quantifies the total sound energy in a given time period, spread over that period. It is the sound level that, if held constant over the given time period, would result in the total sound energy identical to the actual time-varying sound. Hence, in magnitude, it is less than the maximum level of the actual sound, but generally higher than the average level. An event that produces a short, loud "time history" can have the same equivalent level as a slowly rising and falling quieter sound event.

Each of the three figures, Figures 7.1, 7.2 and 7.3, present one hour of measured A-weighted sound levels, in decibels. The three figures quantify the total sound environment and show most of the different types of sounds experienced during the measurement period.

These three figures present several types of information about the measured sound levels. First, the dark, jagged line shows the second-to-second A-weighted sound levels that were measured, rising higher when aircraft fly near or over, or when road vehicles are loud enough to be measured. Second, the horizontal dashed lines show the periods when the different identified sounds were audible. So, for example, a horizontal line at 100 marks the seconds when an aircraft overflight could be heard, and the sound level can be seen to rise accordingly. Finally, the box on the right summarizes how much of the hour each source was audible. For example, in Figure 7.1, overflights were audible for 21% of the time (or about 12½ minutes).

These figures depict the ranges of sound levels visitors experienced at Big Dune Trail during the measurement times, and help in understanding both the non-aircraft and the aircraft produced sound environments discussed in the following sections. A second type of data presentation used in the following sections will also aid in understanding the sound environment of Big Dune Trail: tabulations of the sound levels experienced during the times the interviewed visitors were on the Trail.

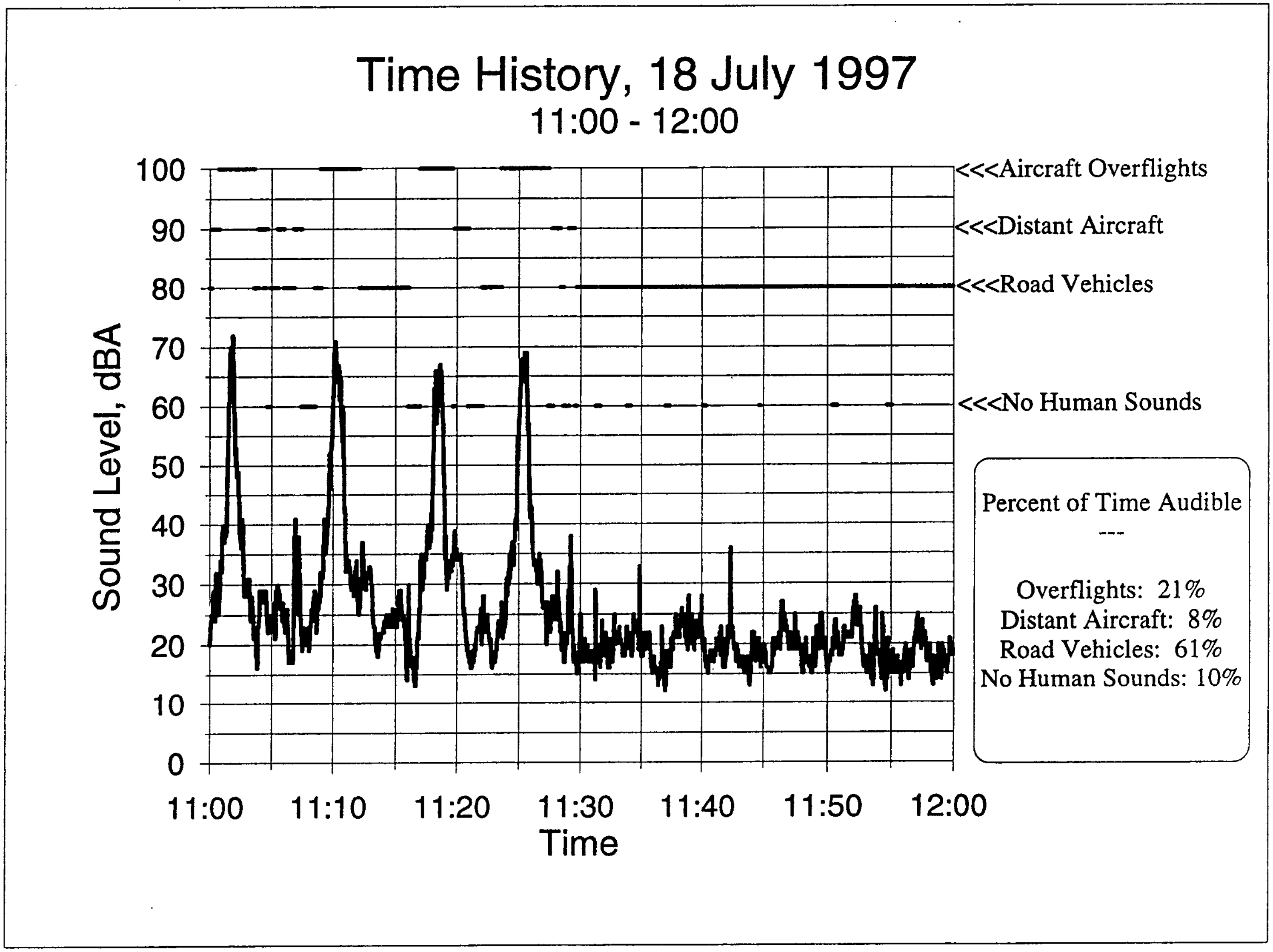

Figure 7.1. Measured Sound Level Time History, 18 July 1997, 11am to Noon

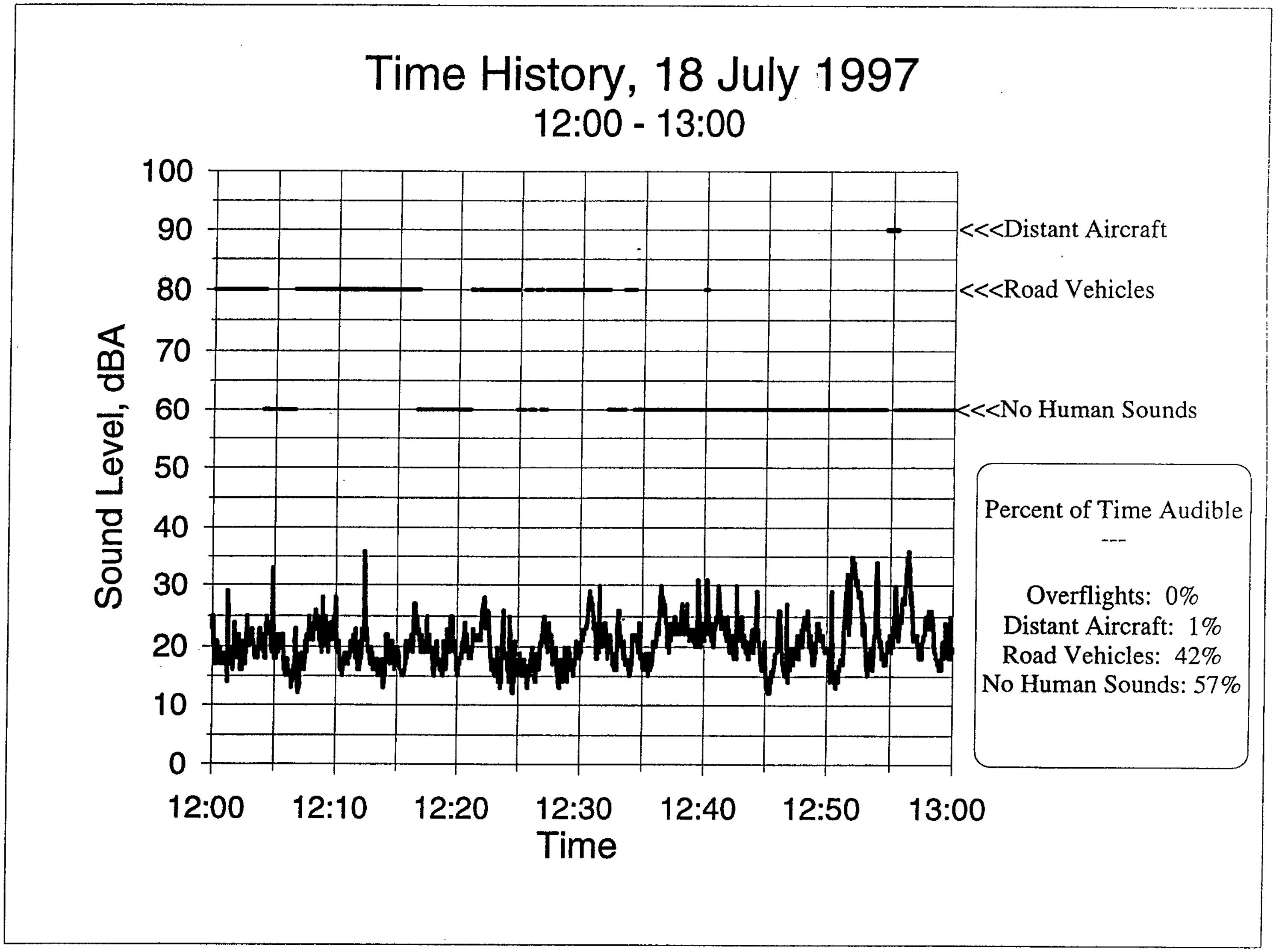

Figure 7.2. Measured Sound Level Time History, 18 July 1997, Noon to 1pm

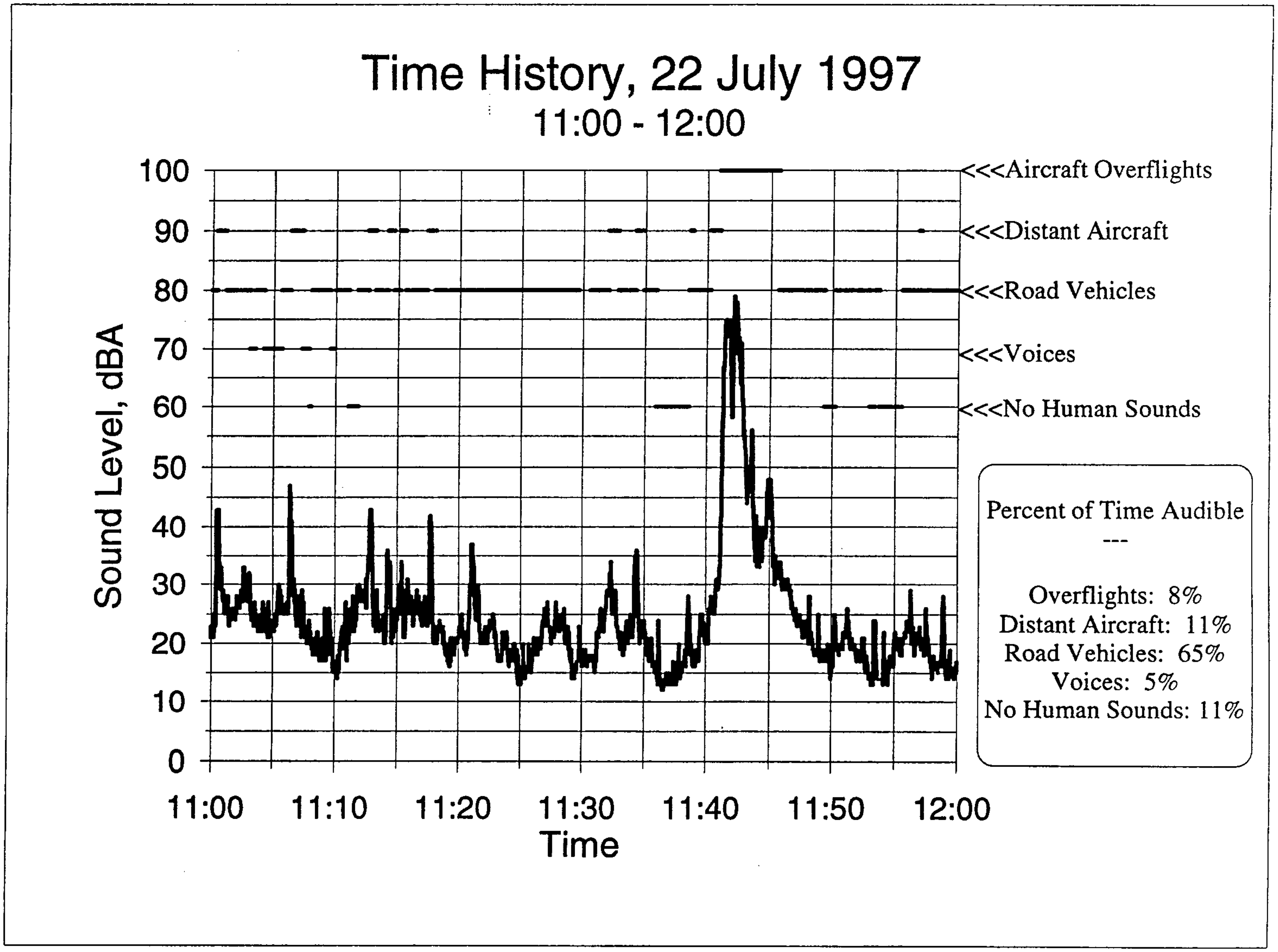

Figure 7.3. Measured Sound Level Time History, 22 July 1997, 11am to Noon

7.3.2 Non-Aircraft Environment

The non-aircraft sound environment should be thought of as the collection of sounds that are present exclusive of the aircraft, and that serve to affect how audible the aircraft will be. Louder non-aircraft sounds mean that in order to be heard, the aircraft sound levels need to be higher than when the non-aircraft sounds are low. Measurements in National Parks have shown that non-aircraft levels can be quite low, thus often making even distant (quiet) aircraft easily heard.

As shown in Figures 7.1, 7.2 and 7.3, non-aircraft levels, including road vehicle sound levels, were generally less than 35 dBA, and mostly are between 15 and 25 dBA during the three hours of measurements shown. Because new, different sounds can generally be heard by an attentive listener when they are below background sound levels, aircraft will be audible in this environment at quite low levels.

Table 7.1 presents more quantitative information about the ranges of non-aircraft equivalent sound levels present during visitor times at the site. Part of the analysis involved computing the difference between aircraft and non-aircraft Leq as a measure of visitor dose, see Section 7.5.2. The non-aircraft Leq is computed by examining time periods during a visit when aircraft are not audible, and computing the equivalent level for that period. Table 7.1 presents for ranges of non-aircraft Leq, the number of visitors interviewed who were present on site for the identified range of Leq. As may be seen, most visitors experienced non-aircraft Leq values ranging from about 16 dBA to about 28 dBA, with a median level of about 22 - 23 dBA.

Table 7.1. Distribution of Non-Aircraft Leq Values for Visitors

Non-Aircraft Leq Range, dBA	No. of Visitors who Experienced Identified Range	Percent of Visitors in Range
12<=Leq<14	2	0.6
14<=Leq<16	16	4.6
16<=Leq<18	24	6.9
18<=Leq<20	61	17.5
20<=Leq<22	56	16.0
22<=Leq<24	45	12.9
24<=Leq<26	54	15.5
26<=Leq<28	26	7.4
28<=Leq<30	13	3.7
30<=Leq<32	6	1.7
32<=Leq<34	0	0.0
34<=Leq<36	7	2.0
36<=Leq<38	5	1.4
38<=Leq<40	1	0.3
40<=Leq<42	9	2.6
(No Leq Computed)	24	6.9
Total	349	100

7.3.3 Aircraft Overflights

When aircraft are heard at the site, two types of aircraft "events" are possible: 1) aircraft may fly visibly overhead or nearby, and shall be termed "overflights" or "overflight events"; 2) aircraft may be audible, but not visible, often departing from a runway and flying in a direction that does not take them near or over the Park. These latter shall be termed "distant" aircraft events. The loudest aircraft events were the overhead or nearby, visible overflights.

Table 7.2 gives the numbers of interviewed visitors who were at the site during various numbers of aircraft overflights. The table also gives the percent of visitors who experienced each number of overflights. Though 96 (about 28%) of the visitors were at the site when there were no overflights, about ⅔ of the visitors experienced one to 10 aircraft overflights, and a few experienced a dozen or more during their time at the site. It should be noted that often aircraft overflights occurred in quick succession, with a second (or third) aircraft flying over before the first became inaudible. (See

Section 7.3.4 for tabulation of the distant aircraft events experienced by the 96 interviewees who were present when no overflights occurred.)

Table 7.2. Numbers of Visitors Experiencing Different Numbers of Overflights

Number of Overflights	Number of Visitors	Percent of Visitors
0	96	27.5
1	77	22.1
2	48	13.8
3	17	4.9
4	16	4.6
5	25	7.2
6	17	4.9
7	14	4.0
8	6	1.7
9	6	1.7
10	4	1.1
11	2	0.6
12	12	3.4
13	6	1.7
14	1	0.3
15	2	0.6
Total	349	100

For those visitors who were there during overflights, Table 7.3 gives the numbers of visitors who were present for different maximum aircraft produced sound levels. As shown, the maximum A-weighted sound levels for overflights ranged from a low of 40 to 45 dBA, to a high of 90 to 95 dBA. Over 90% of the 253 interviewed visitors who were there during overflights experienced maximums over 60 dBA, and thus could have experienced some period of speech disruption. These relatively high levels mean that most visitors remember hearing aircraft (see Section 7.6.1).

Table 7.3. **Numbers of Visitors Present During Different Maximum Overflight Sound Levels**

Aircraft Overflight Maximum Sound Level Range, dBA	No. of Visitors who Experienced Identified Range	Percent of Visitors in Range
40<=Lmax<45	3	1.2
45<=Lmax<50	0	0.0
50<=Lmax<55	6	2.4
55<=Lmax<60	10	4.0
60<=Lmax<65	5	2.0
65<=Lmax<70	19	7.5
70<=Lmax<75	30	11.9
75<=Lmax<80	35	13.8
80<=Lmax<85	60	23.7
85<=Lmax<90	75	29.6
90<=Lmax<95	10	4.0
Total	253	100

7.3.4 Distant Aircraft Operations

For the interviewed visitors who where at the site when there were no overflights, Table 7.4 gives the number of these visitors who were present for different numbers of distant aircraft events. Only 18 of the total 349 interviewees (or about 5%) were present on site while there were neither overflights nor distant aircraft events.

For visitors who were present for only distant aircraft events, Table 7.5 gives the numbers of visitors present for ranges of maximum sound level from these events. For about 88% of these visitors, the maximum sound level heard from the distant aircraft operations was less than 60 dBA.

Table 7.4. Numbers of Visitors Experiencing Only Distant or No Aircraft Events

Number of Distant Aircraft Events	Number of Visitors Present for Given Number of Events
0	18
2	27
4	9
6	13
8	10
10	6
12	10
14	1
16	0
18	0
20	2
Total	96

Table 7.5. Numbers of Visitors Present During Different Maximum Sound Levels from Distant Aircraft

Distant Aircraft Maximum Sound Level Range, dBA	No. of Visitors who Experienced Identified Range	Percent of Visitors in Range
25<=x<30	4	5.1
30<=x<35	5	6.4
35<=x<40	10	12.8
40<=x<45	21	26.9
45<=x<50	19	24.4
50<=x<55	3	3.8
55<=x<60	7	9.0
60<=x<65	4	5.1
65<=x<70	0	0.0
70<=x<75	0	0.0
75<=x<80	1	1.3
Missing (no Max computed)	4	5.1
Total	78	100

The decision was made to analyze the responses of all visitors together, regardless of whether visitors were exposed to overflight events or to only distant aircraft events. This decision was made for several reasons. Primarily, at least 70% of the visitors who experienced any overflight events, also were present for some distant aircraft events. Hence, their reactions to aircraft sounds could have been influenced by distant as well as overflight events; categorizing them as reacting to only overflights would have been incorrect. Second, the sound levels experienced, whether from distant or overflight events, generally represent a continuum of sound exposure, from maximums of over 90 dBA, to maximums of 25 to 30 dBA, see Figure 7.4. Finally, because the goal was not only to understand visitor reactions to the sound of military aircraft, but to also characterize visitor reactions at Big Dune Trail, it was judged appropriate to analyze all visitors as a group, rather than to separate those who experienced only distant aircraft from those who experienced only overflights or who experienced both distant and overflight aircraft.

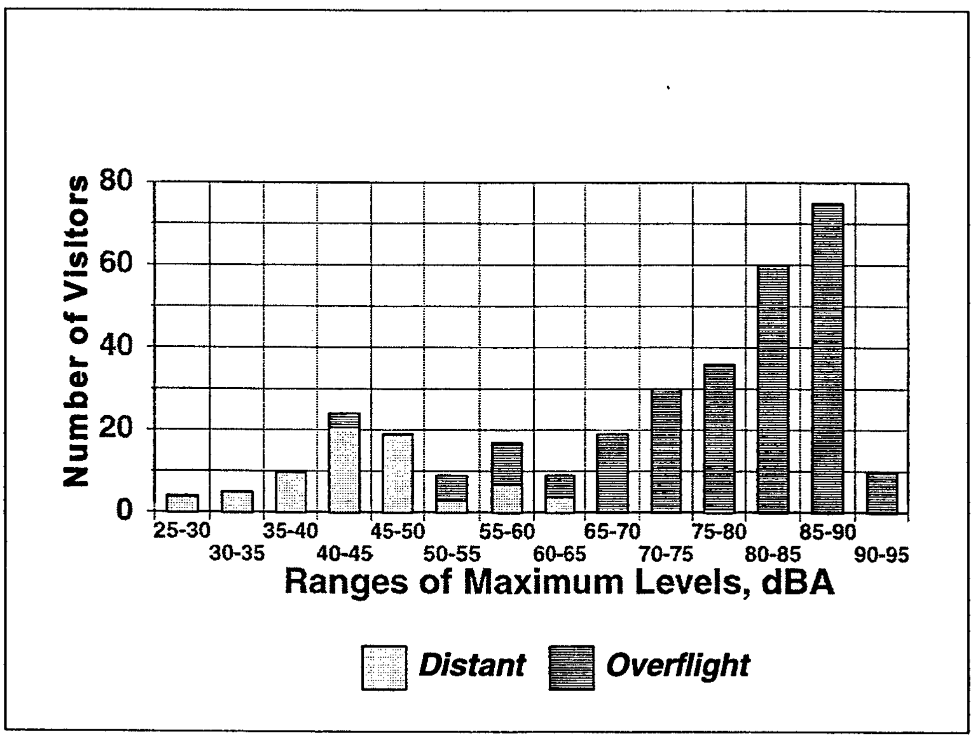

Figure 7.4. Numbers of Visitors Exposed to Different Aircraft Maximum Levels

7.4 Visitor Characteristics

Interviews were conducted of 381 visitors, and this section provides basic information about those visitors. This information is intended to help in understanding how the data were analyzed, and to document the visitor population interviewed.

First, Table 7.6 gives the number of interviews relative to the occurrence of aircraft sound during the visit, and the visitor's reaction, in terms of whether or not the visitor remembered hearing aircraft. Only 18 interviewees were present when no aircraft were observed; two of these visitors reported hearing aircraft, but do not appear in the dose-response analyses since they received no dose. Dropped from further analysis were the 30 interviews (collected on the first day of measurements) when the equipment was not functioning properly and two visitors who stayed much longer on site than anyone else. These two sets of deletions leave 349 interviews tabulated here, of which 333 received aircraft "doses". Interviewees who stated that they heard no aircraft, but during whose visit aircraft were observed were treated as receiving a dose, and were assigned the response of being "not annoyed".

Table 7.6. Total Numbers of Interviews

Aircraft Observed, Visitor Reaction	Number of Interviews in Category
No aircraft observed, visitor reported no aircraft heard	16
No aircraft observed, visitor reported hearing aircraft	2[1]
Aircraft observed, visitor reported no aircraft heard	58[2]
Aircraft observed, visitor reported hearing aircraft	275[3]
Interview invalid due to equipment failure	30[4]
Total	**381**

[1] Though these two respondents are included in the tabulations presented in this report, they do not enter into any of the dose-response analyses because they received no dose.

[2] Treated as receiving a dose and having zero (e.g. "not annoyed") response.

[3] Two of these respondents are excluded from all tabulations and analyses. Their times on site were extreme outliers at 3 hours and 10 minutes, and could have significantly biased analysis results. See Table 7.14 for distribution of other visitor times.

[4] Excluded from all analyses.

Table 7.7 gives the number of visitors interviewed while the informational sign was up or was down (not present). Tables 7.8, 7.9 and 7.10 respectively give number of first time visitors interviewed, gender of visitors interviewed and their age distribution. Table 7.11 gives the number of interviewed visitors who were in groups of 3 or more, and the number who were accompanied by children (under the age of 16).

Table 7.7. Interviews Conducted with and without Sign Posted

Sign Condition	**Number of Interviews in Category**
Sign Up	173
Sign Down	176
Total	**349**

Table 7.8. Visitor Demographics - First Time Visitors

First Visit to White Sands?	**Number of Interviews in Category**
Yes	319
No	40
Total	**349**

Table 7.9. Visitor Demographics - Gender

Visitor's Gender	**Number of Interviews in Category**
Male	177
Female	171
Did not answer	1
Total	**349**

Table 7.10. **Visitor Demographics - Age**
(A break-down by different age groupings is provided on page 6 of Attachment 1.)

Interviewed Visitor's Age, Years	Number of Interviews in Category
16 - 29	110
30 - 39	73
40 - 49	79
50 or over	87
Total	**349**

Table 7.11. Visitor Demographics - Group Size and Groups with Children

Type of Group	Number of Interviews in Group Type	Percent of Total Interviews
Groups with 3 or more adults	129	37%
Groups with Children	171	49%

7.5 Metrics of Aircraft Noise Dose

Two metrics have been used in this analysis to characterize the aircraft "noise dose". One, percent of time aircraft are audible (Percent Time Audible), was investigated and used in the previous National Park Service dose-response work.[20] The second metric, termed here "Relative Leq" was briefly examined in this previous study (see Appendix J of NPOA Report No. 93-6), and has been used here. The following sections describe these metrics and the reasons for their use here.

[20] Anderson, G.S., *et al*, "Dose-Response Relationships Derived from Data Collected at Grand Canyon, Haleakala and Hawaii Volcanoes National Parks", October, 1993, HMMH Report 290940.14, NPOA Report No. 93-6.

7.5.1 Percent of Time Audible

This dose was used for several reasons. First, the previous NPS work (Anderson, *et al*) demonstrated that it correlates well with visitor responses. Second, it may be easily and inexpensively measured with a stop-watch, without use of acoustical instruments, by personnel with very little training. Thus, with relatively little effort, it may be determined at a park location and compared with the dose-response curves, if applicable. Third, it corresponds well with the concept of natural quiet, one of the resources the National Park Service is charged with preserving. When aircraft are audible, natural quiet is lost. Finally, decision makers, faced with deciding how much aircraft (or other) noise is acceptable, can readily imagine what it might be like to be able to hear aircraft a given percent of the time - they need not understand decibels.

Percent of time audible also has several shortcomings as well. Most significantly, it cannot be determined with standard, unattended monitoring; an attentive listener must be present. Thus, it is a dose metric than cannot be determined for long periods of time, without devotion of extensive hours of labor. Second, and perhaps as significant, it is a metric that is difficult to predict. Audibility depends upon the time-varying sound spectra of both the aircraft and the non-aircraft sound levels. Simply quantifying these two variables over time is difficult, while computing the resulting audibility with accuracy depends upon having a reasonable estimation of these variables.

Table 7.12 presents the numbers of visitors who were present for various amounts of audible aircraft noise. Most visitors were present while aircraft could be heard between 10 and 50 percent of their time at the site.

Table 7.12. **Numbers of Visitors Present for Different Ranges of Percent of Time Aircraft Were Audible**

Percent of Time Aircraft Audible During Visitor's Time on Site	No. of Visitors who Experienced Identified Range	Percent of Visitors in Range
0<x<5	14	4.0
5<=x<10	11	3.2
10<=x<15	45	12.9
15<=x<20	28	8.0
20<=x<25	11	3.2
25<=x<30	27	8.0
30<=x<35	28	7.7
35<=x<40	21	6.0
40<=x<45	25	7.2
45<=x<50	37	10.6
50<=x<55	19	5.4
55<=x<60	12	3.4
60<=x<65	18	5.2
65<=x<70	14	4.0
70<=x<75	11	3.2
75<=x<80	2	0.3
80<=x<85	5	1.4
85<=x<90	2	0.6
90<=x<95	1	0.3
Missing (no audible aircraft)	18	5.2
Total	349	100

7.5.2 Relative Sound Level, (aircraft L_{eq} minus background L_{eq})

The aircraft L_{eq} portion of this dose is used because it is comparable to metrics traditionally used by the Department of Defense, the Federal Aviation Administration, the Department of Housing and Urban Development, and the Environmental Protection Agency. This type of metric has "standing" within the federal government and in the acoustics literature for the assessment of aircraft sound.

The relative sound level was chosen, instead of simply the aircraft L_{eq} for several reasons. First, initial work (see Appendix J of reference in footnote 20), showed that using this difference between aircraft sound and background sound tended to eliminate the differences in response from one site to another. When only aircraft noise (aircraft L_{eq}) is used as a dose, sites with low levels of background noise tended to show visitors as being more sensitive to aircraft noise than were visitors at sites having higher background noise levels. Such differences in visitor sensitivity may be due largely to the fact that aircraft are easier to hear at the quieter site. By using the relative sound level as the dose, these effects of different background levels are reduced, and the resulting dose-response curves may be more easily applied to different sites. Technically, using relative sound level tended to "collapse" the dose-response curves from different locations. Using the difference metric moved the curves toward each other, thus strongly suggesting that differences from site to site in dose-response could be partly accounted for by the concept that intrusion of aircraft relative to background sound plays an important role in determining visitor response.

Second, from an intuitive perspective this intrusion concept also is reasonable. A given level of aircraft sound (L_{eq}) is likely to be more noticed or more annoying at a quiet site than at a site with a high level of background sound.

Third, it is good practice to have the dose-response curves dependent upon the local sound environment. History has shown that, no matter what detailed caveats are placed on research results, the results are often applied to situations where their applicability is questionable, if not incorrect. Including the effects of the background sound levels will help control the use of the results. For example, if someone applies these White Sands results to a community park in a suburban or urban area, the higher background levels likely at such sites will automatically and appropriately reduce the indicated effects of intruding aircraft noise.

Finally, the L_{eq} metric is the one commonly produced by most noise prediction computer programs, and measured by most standard sound monitoring instruments. Thus, these standard methods could be used to provide the sound level information necessary for appropriately modeling aircraft sound levels and applying the dose-response curves to the results.

Table 7.13 gives numbers of visitors who were present on site during different ranges of relative L_{eq}. These ranges can be less than zero when aircraft are not very loud and are audible for relatively short times. For example, the hour of data shown in Figure 7.2 has distant aircraft audible for only 1% of the time, and very quiet. The relative L_{eq} for this hour is approximately -22 dB. For Figure 7.1 the relative L_{eq} is about 30 dB, and for Figure 7.3 about 35 dB.

Table 7.13. Numbers of Visitors Present for Different Ranges of Relative Sound Level (Aircraft L_{eq} minus Background L_{eq})

Relative L_{eq} During Visitor's Time on Site	No. of Visitors who Experienced Identified Range	Percent of Visitors in Range
-40<=x<-35	3	0.9
-35<=x<-30	0	0.0
-30<=x<-25	2	0.6
-25<=x<-20	1	0.0
-20<=x<-15	0	0.0
-15<=x<-10	3	0.9
-10<=x<-5	12	3.4
-5<=x<0	11	3.2
0<=x<5	11	3.2
5<=x<10	16	4.6
10<=x<15	14	4.0
15<=x<20	18	5.2
20<=x<25	26	7.4
25<=x<30	50	14.3
30<=x<35	19	5.4
35<=x<40	18	5.2
40<=x<45	59	16.9
45<=x<50	35	10.0
50<=x<55	27	7.7
Missing(no relative Leq computed)	24	6.9
Total	349	100

Both metrics of aircraft noise dose are dependent upon the amount of time the visitors were on the site. For percent of time audible, the relationship between audible aircraft and amount of time on the site is clear; for example, 50% of the time audible simply means for half the minutes the visitor was on the site, aircraft were audible to an attentive listener. For relative sound level, the meaning is not so clear. If, for example, two visitors received the same relative sound level, but one was on site twice as long as the other, the one who was present longer experienced twice the sound energy from aircraft (assuming non-aircraft noise was the same for both visitors). This extra sound energy could have been due to longer aircraft events, louder aircraft events, more aircraft events, or any combination. Table 7.14 gives the numbers of visitors present for different ranges of time. From the table, about two-thirds of visitors were present on site for less than 30 minutes, and 90% were present for less than 40 minutes.

Table 7.14. Numbers of Visitors Present on Site for Different Amounts of Time

Duration of Visitor's Time on Site (minutes)	No. of Visitors who Experienced Identified Range	Percent of Visitors in Range
10<=x<15	57	16.3
15<=x<20	64	18.3
20<=x<25	66	18.9
25<=x<30	36	10.3
30<=x<35	60	17.2
35<=x<40	35	10.0
40<=x<45	15	4.3
45<=x<50	3	0.9
50<=x<55	4	1.1
55<=x<60	4	1.1
60<=x<65	0	0.0
65<=x<70	2	0.6
70<=x<75	2	0.6
75<=x<80	0	0.0
80<=x<85	0	0.0
85<=x<90	1	0.3
Total	349	100

7.6 Metrics of Visitor Response

Two visitor responses were examined for those visitors who answered that they remembered hearing aircraft (question 8 of the questionnaire, Appendix A). These responses are answers to questions 9 and 10 of the questionnaire. Question 9 asked the visitor about annoyance:

9. Were you bothered or annoyed by aircraft noise during your visit to Big Dune Trail? Were you not at all annoyed, slightly annoyed, moderately annoyed, very annoyed, or extremely annoyed?

The response to this question was used because it is the response currently in use by the Environmental Protection Agency and the Federal Aviation Administration to assess sound in residential communities. In brief, this response has "standing" within the federal government and in the acoustics literature for the assessment of the effects of all types of sounds in the community, including those from aircraft. Further, it is one of the responses analyzed in the previous National Park Service dose-response research (reported in the reference of footnote 20).

Part 2 of question 10 asked about interference with natural quiet:

10. How much did the sound from aircraft interfere with each of the following aspects of your visit at Big Dune Trail?

    Did the sound from aircraft interfere with you appreciation of the natural quiet and sounds of nature at the site - not at all, slightly, moderately, very much, extremely.

The response to this question was used because natural quiet is one of the resources the National Park Service is charged with preserving within national parks. Also, this is the other primary response identified and analyzed in the National Park Service dose-response work.

The following three subsections summarize the responses to the hearing of aircraft, annoyance and interference questions.

7.6.1 Hearing Aircraft

Table 7.6 above summarizes for all interviews the visitor responses to hearing of aircraft. In summary, of 349 interviews, 333 visitors were present when aircraft noise was audible, 275 of these or 83% reported hearing aircraft, while 58 of these or 17% reported hearing no aircraft (and were put in the "not at all" annoyed category). Eighteen visitors were present when no aircraft were audible, 16 of these reported hearing no aircraft and 2 reported hearing aircraft.

7.6.2 Annoyance

Table 7.15 presents the detailed responses that the interviewed visitors gave when questioned about how annoyed they were by aircraft noise while at Big Dune Trail. Only the visitors who said that they heard aircraft were asked this annoyance question. In the table, any visitor who was present when aircraft were heard by the aircraft observer and who said they heard no aircraft are counted as "not at all" annoyed. Eighteen visitors were present when no aircraft were heard, and 16 of these said they heard no aircraft, while two said they did (see footnotes to Table 7.6).

In the development of the dose response analyses, recall that these responses are "dichotomized" or divided into two groups of annoyed and not annoyed. For all analyses, the dichotomization is between "slightly" and "moderately" so that visitors are considered annoyed if they respond with "moderately," "very," or "extremely." Hence, from Table 7.15, 37 respondents or 11% were annoyed.

This chosen dichotomization was the one used in the National Park Service dose-response analysis. It is considered preferable to the two possible dichotomizations further *up* the response scale because those two dichotomizations were judged by the National Park Service to not sufficiently protect the visitor experience. The National Park Service states that it wishes to provide a *quality* environment for visitors, rather than just a *bearable* environment. In the other direction, the chosen dichotomization was preferable to the dichotomization further *down* the response scale, between "not at all" and "slightly," because the "slightly" response was judged likely to be rather unstable—that is, too variable and too arbitrarily chosen by an interviewee. Such a dichotomization includes in the YES group those visitors who responded "slightly." Any attempt to substantially reduce the number of visitors who are only "slightly" affected would be likely to restrict aircraft activity unreasonably, while achieving only minimal additional benefit to visitors.

Table 7.15. Visitor Responses to Annoyance Question

Visitors who were present when aircraft were audible		
Annoyance Response	Number	Percent
Extremely	4	1%
Very	10	3%
Moderately	22	7%
Slightly	38	11%
Not at All (58 heard no aircraft)	256	78%
TOTAL	330	100%
No aircraft present and heard no aircraft	16	
Heard a/c, but no dose	2	
Did not answer question	1	
TOTAL	349	

This type of data are often interpreted to mean that aircraft noise annoys very few visitors. This may be true, but such a conclusion is not completely accurate without knowing what aircraft noise each visitor could have heard. Hence, the need for the more complicated dose-response analysis, where each visitors "noise dose" is considered. For example, if only a few of the visitors were present when aircraft were overhead and very loud while all other visitors experienced only quiet distant aircraft noise, it would be incorrect to conclude that any aircraft noise would not annoy visitors.

7.6.3 Interference with Appreciation of Natural Quiet

Table 7.16 tabulates the responses to question 10. Note that more visitors judged that their appreciation of natural quiet was interfered with by the sound of aircraft, than were annoyed by it. This result is consistent with not only the National Park Service dose-response and various visitor surveys, but with the general conclusions of the cognitive interviews, see Section 8. In brief, when visitors respond to the question about annoyance, they tend to judge their emotional state - are they upset, did aircraft noise "get my blood pressure up". Interference is a non-emotional, more objective judgement. Hence, it is possible for a person to believe the sound interfered to some degree with their appreciation of natural quiet but not be very annoyed about this interference.

Table 7.16. Visitor Responses to Interference with Natural Quiet Question

Visitors who were present when aircraft were audible		
Interference Response	Number	Percent
Extremely	19	6%
Very	24	7%
Moderately	41	12%
Slightly	52	16%
Not at All (58 heard no aircraft)	193	59%
TOTAL	329	100%
No aircraft present and heard no aircraft	16	
Heard a/c, but no dose	2	
Did not answer question	2	
TOTAL	349	

7.7 Description of Analysis Approach

A brief overview of the dose-response method is provided in Section 3 of this report, and Appendix B provides a full, detailed description of the analysis conducted for this study and the associated results. The first sub-section below gives a brief description of the analytical method, logistic regression. The following sub-section, 7.7.2, then attempts to provide a qualitative understanding of the form of the data and of the analysis method by using the data that describe the effects on annoyance or interference of providing information about aircraft to visitors. Finally, sub-section 7.7.3, presents the dose-response curves.

7.7.1 Logistic Regression

The analysis was conducted using logistic regression. This is a statistical method commonly used to quantify how people respond to various doses of a stimulus. The dose can be any stimulus having many possible values; the response is generally put into a binary "yes" or "no" form. Logistic regression provides a dose-response curve that tells, with some level of certainty, the probability that a given percent of people will respond "yes" for a given value of the noise dose.

Mediators (such as providing visitors with information that they may experience military aircraft overflights), are tested by determining whether different values of the mediator (posting or not posting a sign telling about military aircraft overflights) result in significantly different dose-response curves. If, for example, putting up a sign that tells about the aircraft significantly shifts the curve so that at a given dose, a smaller percent of the visitors are annoyed, then not only does providing information about overflights reduce visitor annoyance, but a management tool for affecting visitor experience has been identified. By so testing a number of mediators, statistically significant ones may be identified, and these may help airspace and park management personnel improve park visitor experience when military overflights are unavoidable.

7.7.2 Qualitative Description of the Data and the Analysis

7.7.2.1 Effect of Information on Annoyance Response.

Table 7.17 provides the distribution of annoyance responses as a function of whether the sign was up or not. (Recall that the approach to examining the effect of providing information about overflights was through posting, or not posting, a sign at the trail head. See Section 3.3.3.) From this table, it is not apparent that the sign had any significant affect on the distribution of annoyance responses: the "sign up" and "sign down" response distributions are not very different from each other or from the total distribution.

Table 7.17. **Effect of Sign on Visitor Annoyance Response**

Annoyance Response	Sign Up		Sign Down		Total	
	Number	Percent	Number	Percent	Number	Percent
Extremely	3	2%	1	1%	4	1%
Very	3	2%	7	4%	10	3%
Moderately	10	6%	12	7%	22	7%
Slightly	17	10%	21	13%	38	11%
Not at All	131	80%	125	75%	256	78%
TOTAL	164	100%	166	100%	330	100%

Table 7.17, however, provides no information about aircraft noise dose. Was the distribution of doses for the "sign up" periods significantly different from the "sign down" periods? Figure 7.5 plots all responses to the annoyance question as a function of the percent of time aircraft were audible while each visitor was at the site. Responses of the visitors who were at the site while the sign was up are shown as solid squares; sign down visitor responses are open squares. The responses have been "jittered" vertically to make them more visible.

At least two observations are possible. First, the slightly to extremely annoyed responses are distributed to the right showing that visitors who experienced the larger percents of time audible, are more likely to be annoyed. Second, the greater annoyance responses are at the larger percents, also indicating that the longer aircraft are audible, the more annoyed visitors will be. Third, for the most part, the sign up responses are mixed fairly evenly among the sign down responses, suggesting that presence of the sign seems to have had little obvious effect on annoyance response.

Figure 7.6 plots the same set of responses against the other dose - relative sound level. The data still show the trend of more and greater annoyance responses for higher values of relative sound level. The distribution of the responses with dose appears quite different from that of Figure 7.5, but the metrics are so different, that this different distribution is not significant. (Percent of time audible and relative sound level are not well correlated with a correlation coefficient of 0.625, see appendix C, Figure C.1.) But, also note that the x-axis of Figure 7.5 is logarithmic so that the data are compressed to the right.

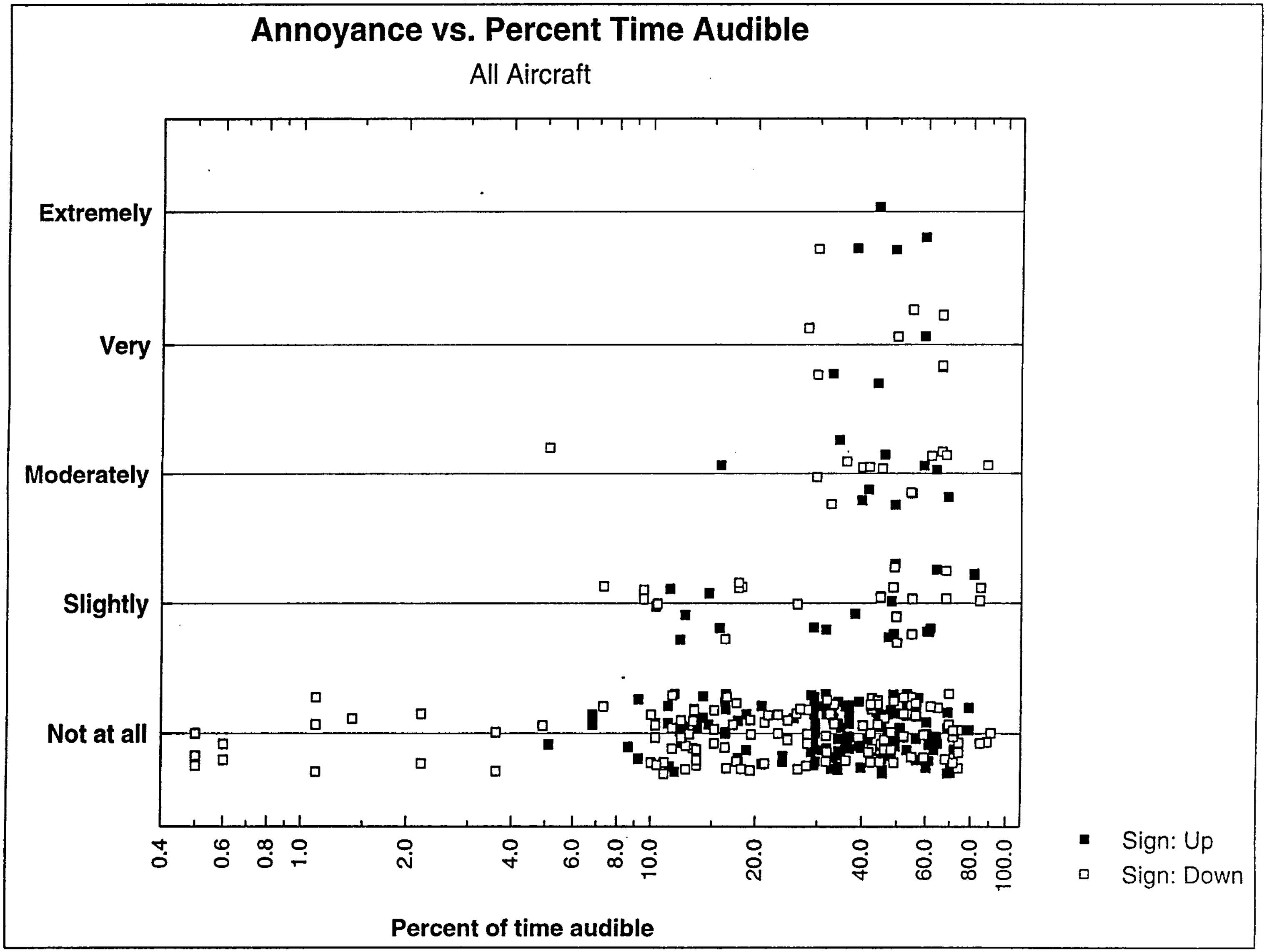

Figure 7.5. Effect of Sign on Visitor Annoyance Responses v Percent Time Audible

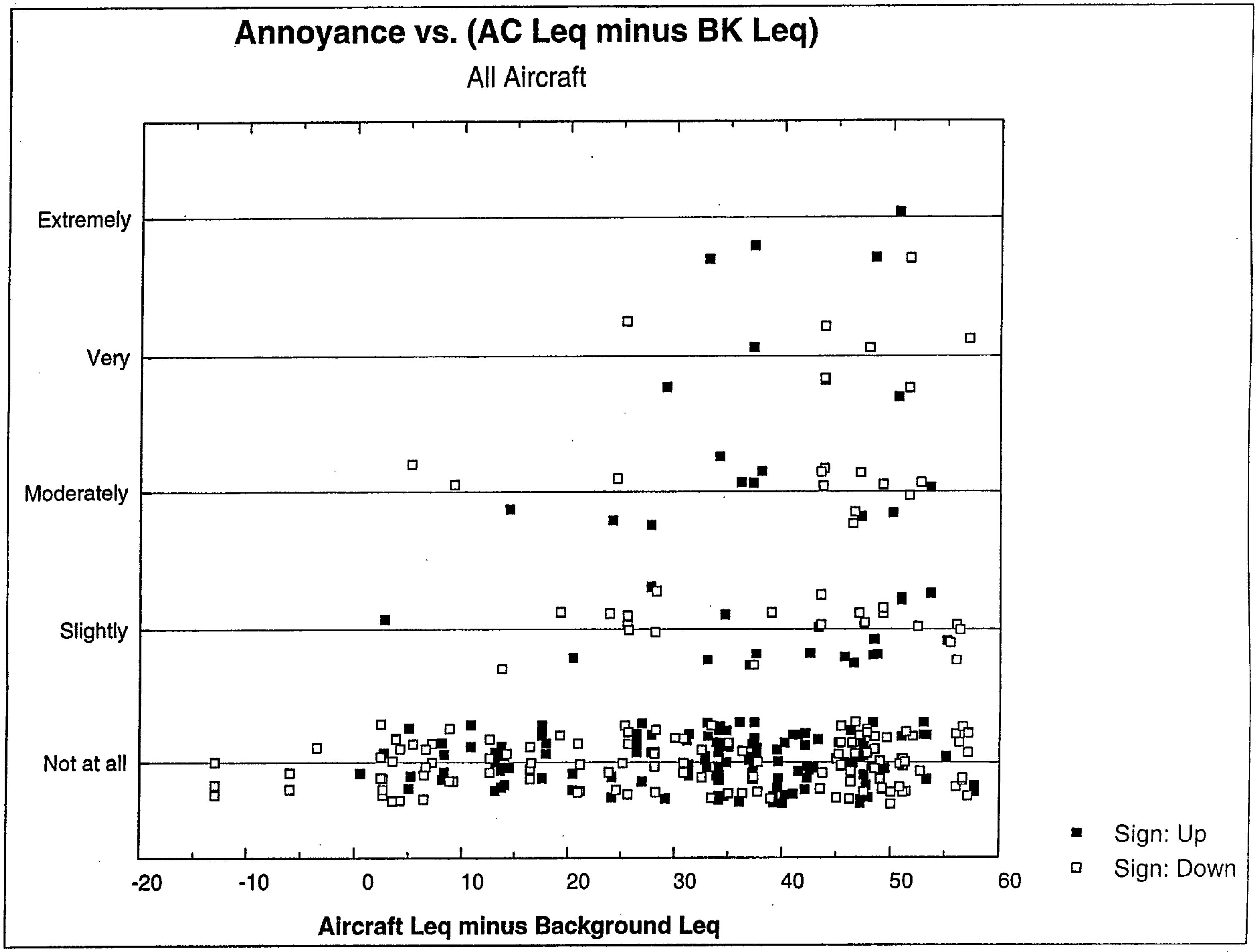

Figure 7.6. Effect of Sign on Visitor Annoyance Responses v Relative Sound Level

This apparent lack of effect of the sign was verified statistically, and found accurate - visitors who remembered the sign did not express any statistically different degree of annoyance (when adjusted for dose) than those who did not remember the sign. Effects of the sign and information in general, were explored by further investigating visitor answers to question 14 that asked whether or not they remembered seeing or hearing any information about aircraft that might fly over the site. Table 7.18 tabulates the responses. When the sign was up, only 40% remembered seeing it. However, for both the periods when the sign was up and down, 24% to 28% remembered some type of information other than the sign.

Table 7.18. Visitors who Remembered Seeing or Hearing Information about Aircraft

Remembered Information	Sign Up		Sign Down	
	Number	Percent	Number	Percent
Sign	69	**40%**	0	**0%**
Other Information	41	**24%**	50	**28%**
None	63	**36%**	126	**63%**
TOTAL	173	100%	176	100%

Figure 7.7 plots the same annoyance responses as a function of percent time audible, but separated by visitors who had any information, whether it was the sign or other information, and by visitors who said they had neither seen nor heard any information about overflights. Compared with the plot of Figure 7.5, there appear to be fewer of the solid squares (visitors with information) at the higher levels of annoyance. Table 7.19 presents the actual numbers.

Table 7.19. Effect of Knowledge of Any Information on Annoyance Response

<table>
<tr><th rowspan="2">Annoyance Response</th><th colspan="3">Any Information</th><th colspan="3">No Information</th><th colspan="2">Total</th></tr>
<tr><th>Number</th><th colspan="2">Percent</th><th>Number</th><th colspan="2">Percent</th><th>Number</th><th>Percent</th></tr>
<tr><td>Extremely</td><td>3</td><td>2%</td><td rowspan="3">6%</td><td>1</td><td>1%</td><td rowspan="3">16%</td><td>4</td><td>1%</td></tr>
<tr><td>Very</td><td>2</td><td>1%</td><td>8</td><td>5%</td><td>10</td><td>3%</td></tr>
<tr><td>Moderately</td><td>4</td><td>3%</td><td>18</td><td>10%</td><td>22</td><td>7%</td></tr>
<tr><td>Slightly</td><td>23</td><td>15%</td><td rowspan="2">94%</td><td>15</td><td>8%</td><td rowspan="2">84%</td><td>38</td><td>11%</td></tr>
<tr><td>Not at All</td><td>120</td><td>79%</td><td>136</td><td>76%</td><td>256</td><td>78%</td></tr>
<tr><td>TOTAL</td><td>152</td><td>100%</td><td></td><td>178</td><td>100%</td><td></td><td>330</td><td>100%</td></tr>
</table>

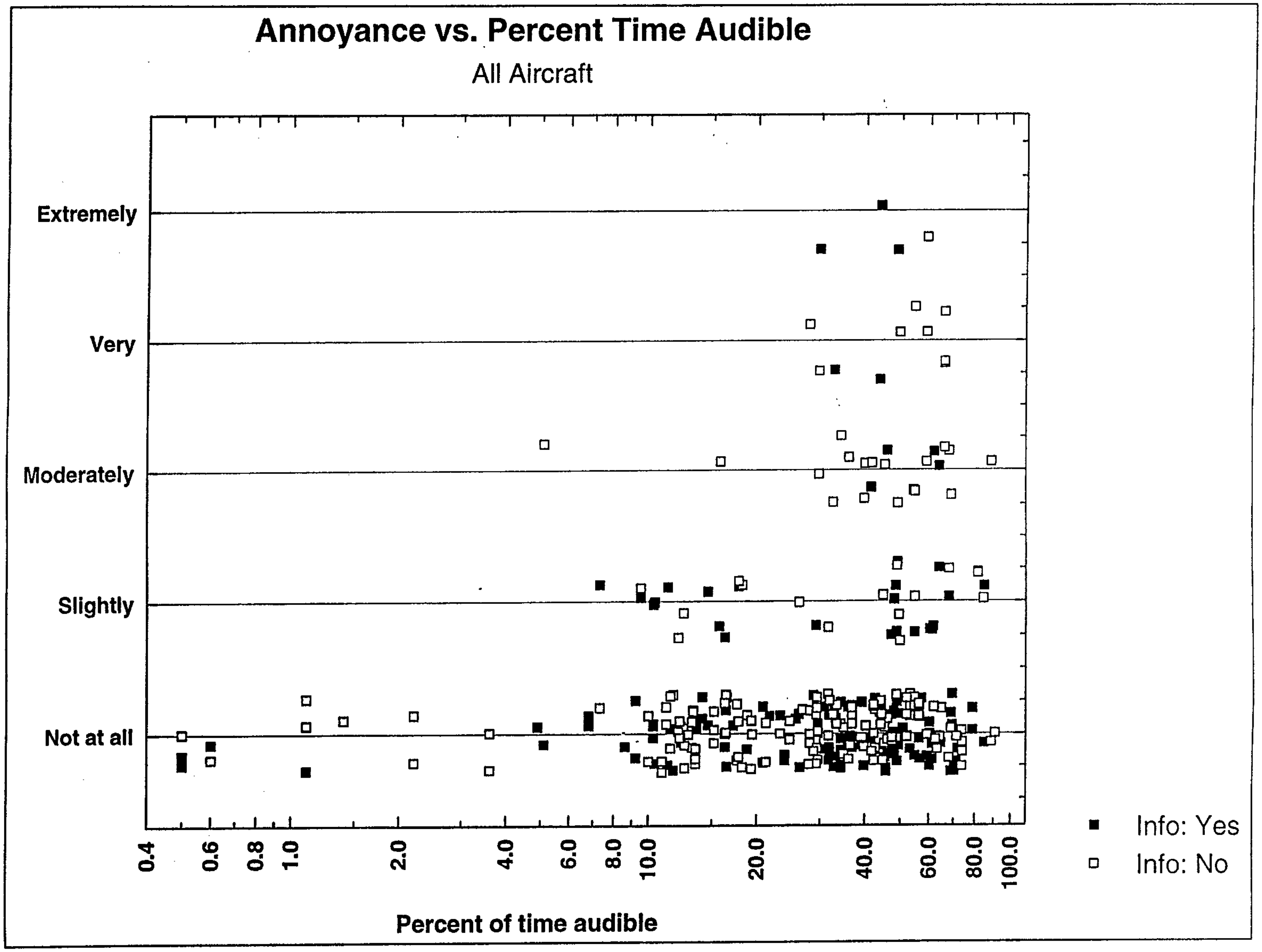

Figure 7.7. Effect of Information on Visitor Annoyance Responses v Percent Time Audible

When the three categories of annoyance - moderately, very and extremely - are added to produce the dichotomized category of "annoyed", 6% of the group with any information are annoyed, while 16% of the group with no information are annoyed. This difference or a change of 10% seems significant, and in fact, when the full analysis of dose-response and mediators is conducted, see Appendix B, having information is 99% certain of lessening visitor's annoyance with aircraft. Figure 7.8 shows the dose-response curves, with 90% certainty regions, for visitors who remembered information and for those who did not. These curves are significantly different in the range of relative sound level from 25 dB to 55 dB; about 50 percent of visitors experienced this range, see Table 7.13.

Figure 7.9 shows the effect of information on annoyance when examined in relationship to percent of time aircraft could be heard. This plot also shows the difference between the two curves, though there is more overlap of the 90 percent regions of certainty. (The detailed analysis, documented in Appendix E, shows these two curves to be significantly different.) The amount of overlaping of confidence intervals is likely due to the distribution of the data with dose. For Figure 7.8, visitor doses are heavily concentrated between 20 dB and 50 dB, while the visitor doses used to generate Figure 7.9 are rather evenly distributed between 0 % and 70 % of the time audible.

7.7.2.2 Effect of Information on Interference with Natural Quiet.

Table 7.20 shows the distribution of visitor responses to the interference question. The distribution of degrees of interference are virtually the same for all degrees. The detailed analysis showed that information affected the interference response at only a 22% to 41% certainty level. (Appendix F lists the primary mediators that did not show sufficient significance and were rejected from further analysis.)

This lack of effect is not surprising considering the result of the cognitive surveys that showed that visitors regard "interference" as an objective, non-emotional concept that denotes simply interrupting some activity. (Section 8, below, discusses the cognitive interviews and results.) Whether or not one expects an aircraft overflight should not affect whether or not an overflight interferes with one's appreciation of natural quiet, unlike annoyance which can be affected by expectations.

Table 7.20. Effect of Knowledge of Any Information on Interference with Natural Quiet

Degree of Interference w/ Natural Quiet	Any Information		No Information		Total	
	Number	Percent	Number	Percent	Number	Percent
Extremely	10	7%	9	5%	19	6%
Very	11	7%	13	7%	24	7%
Moderately	16	11%	25	14%	41	12%
Slightly	27	18%	25	14%	52	16%
Not at All	87	57%	106	60%	193	59%
TOTAL	151	100%	178	100%	329	100%

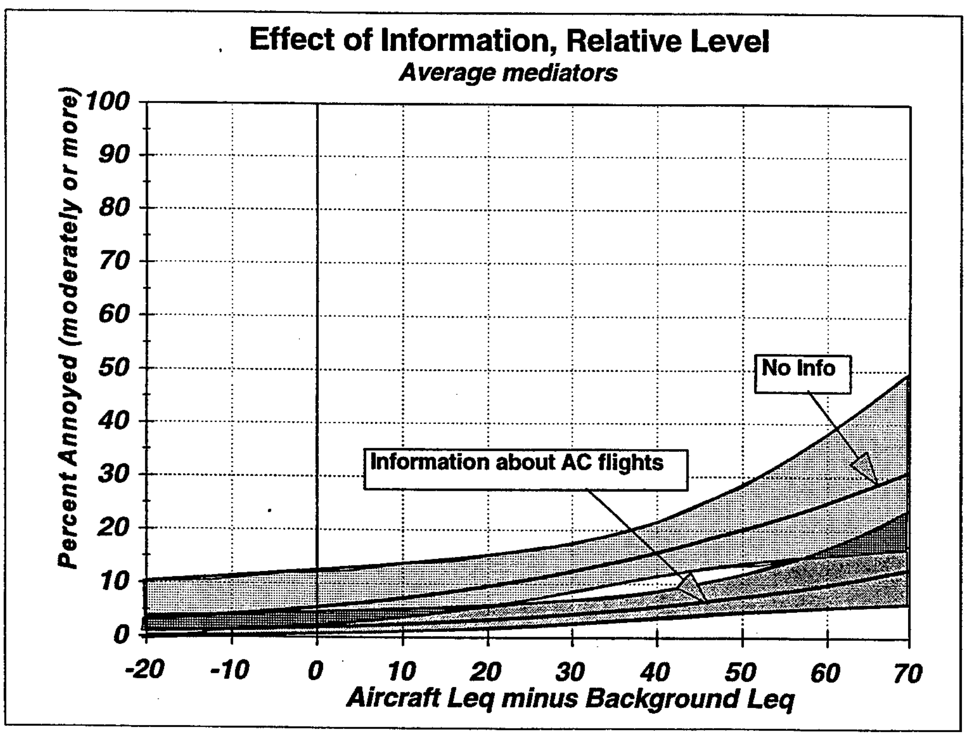

Figure 7.8. Effect of Information on Annoyance Dose-Response, Relative Sound Level

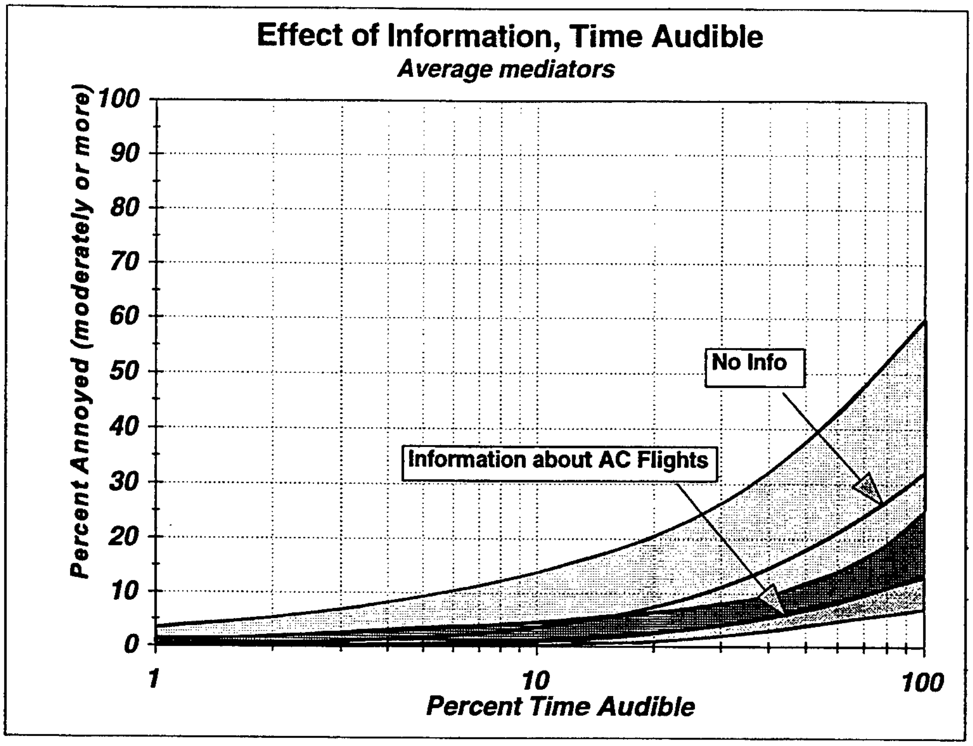

Figure 7.9. Effect of Information on Annoyance Dose-Response, Percent Audible

7.7.3 Dose-Response Curves

Once all the significant mediators are identified, see Section 7.8, their values are set at the average for the data, and dose-response curves, with 90% regions of certainty may be constructed. Table 7.21 gives the average values of the mediators as used for each of the dose-response curves. (Appendix D discusses the calculation of the regions of certainty.) The regions of certainty provide an estimate of the range within which the "true" curve should lie, with 90% certainty. Figures 7.10 through 7.13 present these curves. They are plotted for the average values of the mediators, except for information; they are plotted as though no visitors remembered hearing or seeing information about aircraft overflights. Such plots are thought to be more widely applicable. Recall that Figures 7.8 and 7.9 show the effect of remembering information.

Table 7.21. Average Values of Mediators Used to Plot Dose-Response Curves

Dose-response curve	Number of visitors	Average values of Mediators			
		Natural quiet very important	Groups with children	Women	Age
Annoyance vs. Percent Time Aircraft Audible	329	72 %	49 %	49 %	—
Annoyance vs. Relative Sound Level	323	72 %	49 %	49 %	—
Interference with Natural Quiet vs. Percent Time Aircraft Audible	325	72 %	49 %	49 %	39
Interference with Natural Quiet vs. Relative Sound Level	320	72 %	49 %	49 %	39

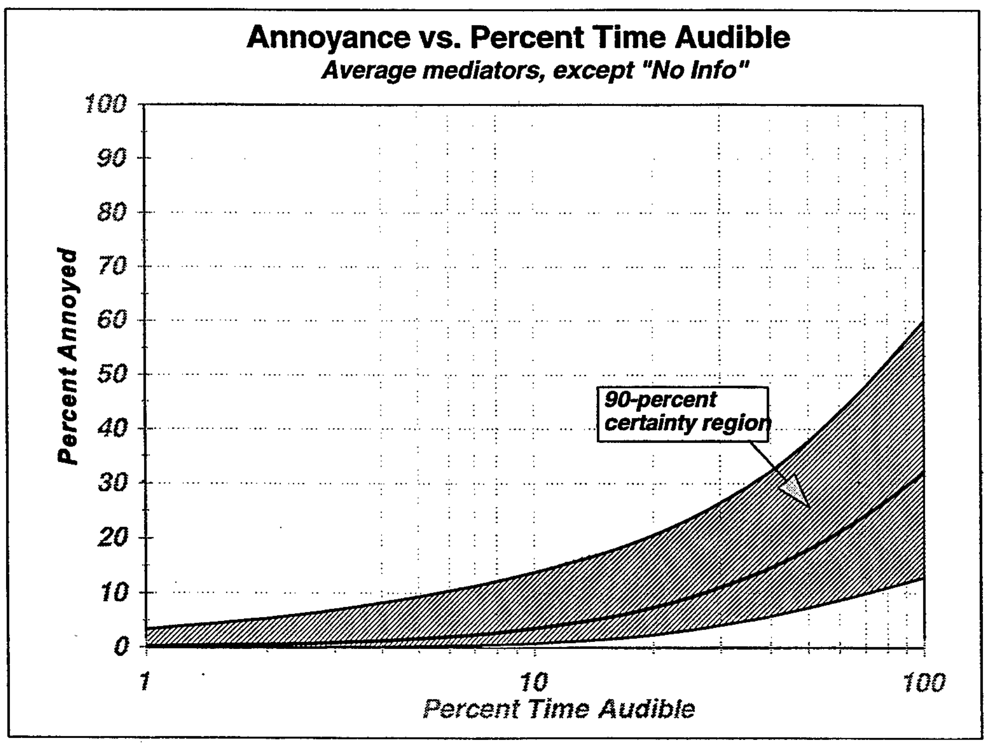

Figure 7.10. Annoyance Dose-Response v Percent Time Audible

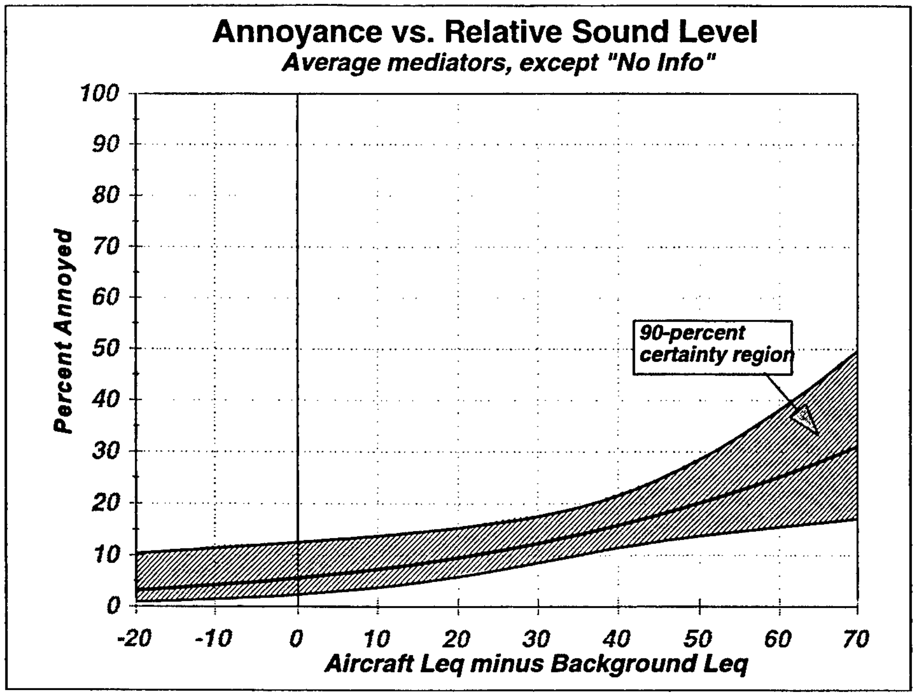

Figure 7.11. Annoyance Dose-Response v Relative Sound Level

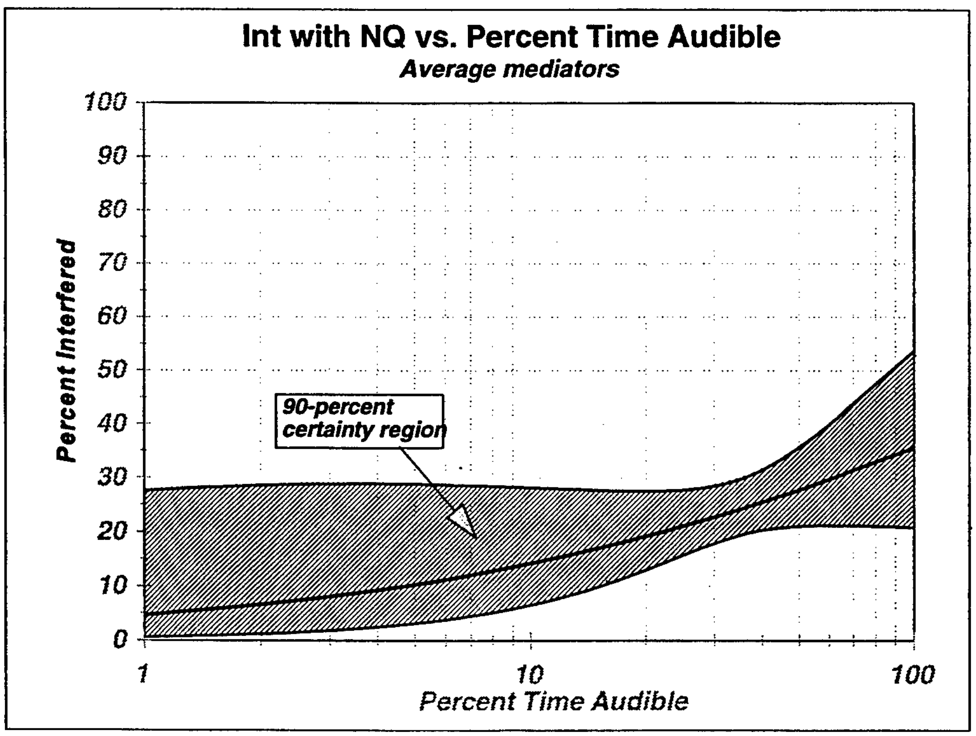

Figure 7.12. Interference Dose-Response v Percent Time Audible

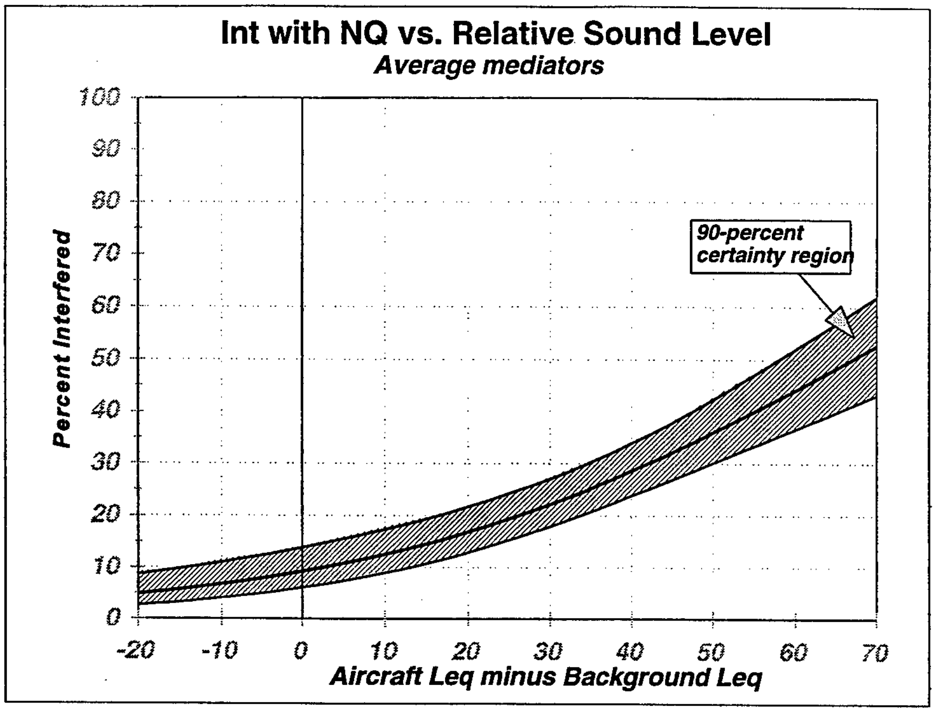

Figure 7.13. Interference Dose-Response Curve v Relative Sound Level

7.8 Summary of Detailed Results

Appendix B gives details about the analysis and the results, while this section summarizes the results. Each of the four combinations of doses and responses were analyzed: 1) annoyance *versus* percent of time aircraft are audible; 2) annoyance *versus* relative sound level; 3) interference with natural quiet *versus* percent of time aircraft are audible; and 4) interference with natural quiet *versus* relative sound level. The importance of the mediators depends upon the specific combination of dose and response analyzed. For this study, conclusions about annoyance and interference with appreciation of natural quiet are generally similar, except for two mediators. First, remembering information about aircraft is important for annoyance and not for interference with natural quiet. Second, age is important in judgements of interference with appreciation of natural quiet, but less so in judgements of annoyance, see below.

1. INFORMATION - Whether or not a visitor remembered information was significant in terms of the visitors' annoyance. **Visitors who remembered information about aircraft were less annoyed with aircraft noise than visitors who did not remember such information. Remembering information had no effect on judgements of interference with appreciation of natural quiet.**

2. **IMPORTANCE OF NATURAL QUIET** - The importance of natural quiet as a reason for visiting the site significantly affected annoyance. **If natural quiet was very or extremely important as a reason for visiting the site, the visitor was more annoyed with aircraft noise and judged that aircraft sound interfered more with the appreciation of natural quiet than did visitors who did not rate natural quiet as so important.**

3. **CHILDREN IN GROUP - Adults accompanied by children (under 16 years of age) were less annoyed and perceived less interference with appreciation of natural quiet than adults who are not accompanied by children.**

4. **GENDER - Women were less annoyed by aircraft noise than were men and perceived less interference with appreciation of natural quiet than did men.**

5. **AGE - Older visitors perceived that aircraft sound interfered less with the appreciation of natural quiet than did younger visitors.** (It should be noted, however, that age had a similar effect on annoyance, but not at quite the level of confidence chosen to accept a mediator as important. Age was 89% certain with respect to annoyance, rather than the required 90%. Appendix F lists the insufficiently significant factors.)

One other mediator that was below the minimum 90% confidence but that should be mentioned, is grouping of aircraft. When considering the dose of percent of time aircraft are audible, grouping naturally is important, because it is included in the dose - the closer in time aircraft fly together (are grouped), the less total time they will be heard. However, the importance of this grouping of aircraft was also somewhat confirmed when analyzing the dose of relative sound level. For this dose, grouping aircraft reduced annoyance, but at a confidence level of 87%. Hence, it did not meet the acceptance criteria, but it is important enough that airspace management and flight operations could probably help some in reducing annoyance by grouping aircraft, if possible.

8. Cognitive Interviews and Results

This section provides the discussion and results of the cognitive interviewing task. Specifically, this section describes the background and purpose, the methodology, and the results obtained from the cognitive interviews conducted with visitors at White Sands National Monument (White Sands N.M.) in April 1997.

8.1 Background and Objectives

Prior dose-response studies conducted in Hawaii Volcanoes, Haleakela, and Grand Canyon National Parks for the National Park Service showed that respondents reported significantly higher levels of impact from aircraft overflights to an item that asked about "interference with the appreciation of the natural quiet and the sounds of nature" than to one that asked "were you bothered or annoyed by aircraft noise during your visit to [site]?" These differences led to questions about respondents' interpretation of the questions and, consequently, the appropriate interpretation of the dose-response survey data.

Cognitive interviews were suggested as a research tool that could be used to investigate the differences in the meaning of these questions to respondents, as well as the appropriate interpretation of the survey responses. Cognitive interviewing is used by social scientists to study the cognitive processes used by respondents during the survey research process. It has been used to better understand all phases of the survey research process, from the initial request to participate in a study, to respondents' satisfaction with the survey research experience after they have completed the interview.

In this application, the purpose is to better understand how respondents interpret and construct their response to certain key questions in an aircraft noise dose-response survey. The key questions include such items as "How bothered or annoyed were you by hearing aircraft?" or "How much did the sound from aircraft interfere with your appreciation of the natural quiet and sounds of nature?" Understanding how respondents interpret the key words and phrases, - "bothered or annoyed" or "interfere with appreciation of the natural quiet" - would help to correctly analyze and interpret the survey responses to each question, and thus explain any differences in responses obtained from these two (or any other) questions.

8.2 Method

To conduct a cognitive interview, respondents are interviewed in much the same way as for a standard survey interview. However, in addition to the questions in the survey instrument, "probe" questions were asked of the respondents. The probe questions asked them to explain the meaning (to them) of specific survey questions and how they constructed a response to these questions. For the cognitive interviews in this study, a questioning strategy of concurrent probing was adopted. In other words, the probes asking about respondent's interpretation were embedded in the questionnaire, immediately after the question, rather than being asked at the end of the interview. The concurrent probing process was selected to avoid the possibility that subsequent questions and answers would influence respondents' recall of the meaning of the question and the process of constructing a response.

Interviews were conducted with visitors who hiked the Big Dune Trail at White Sands N.M. on April 28-30, 1997. An attempt was made to interview all visitors who spent at least 15 minutes on the Big Dune Trail between the hours of 8am and 3pm during the three-day period. To be interviewed, individual respondents also had to be at least 18 years of age and speak English as their first language. English as a first language was required because of the exploratory nature of the cognitive interviews and the need to discuss the meaning of specific words and phrases. A total of 1-2 adult members of each eligible group were interviewed. In those cases where there was more than one respondent per group, an interviewer read the questions aloud to both individuals and asked each of them to discuss their answers individually, one at a time.

A small number of groups (less than 5) were missed because they returned from a hike on the Big Dune Trail while another group was being interviewed. Because the results of these cognitive interviews were not designed to be extrapolated to the population of visitors in the same way as a sample survey, no attempt was made to determine the characteristics of the groups that may have been eligible but were not interviewed.

The original cognitive interview script included probes for a number of different topics and question areas:

Overall enjoyment of Visit to Site

- ◊ What does the term "overall" mean to you?
- ◊ How did you determine what score to select on the 1-5 scale measuring overall enjoyment?

Importance of Viewing the Natural Scenery

- ◊ What do you think I meant when I said "natural scenery?

- ◇ How did you choose a score on the 1-5 importance scale for viewing natural scenery?

Importance of the Natural Quiet and the Sounds of Nature

- ◇ What kinds of things did you think I was referring to when I say "natural quiet and the sounds of nature?"
- ◇ How did you choose a score on the 1-5 importance scale for the importance of enjoying the natural quiet and the sounds of nature?

Hearing (and Seeing) Aircraft

- ◇ How sure are you that you heard/saw (did not hear/see) one or more airplanes, jets or helicopters or other aircraft while you were here at Big Dune Trail?
- ◇ [If respondant heard/saw aircraft] Do you recall what you were doing when you heard/saw the aircraft?

Annoyance Scale

- ◇ What does the phrase bothered or annoyed by aircraft noise mean to you?
- ◇ How did you select the number (X) to circle on the 1-5 annoyance scale?
- ◇ Look at the number 3 on the annoyance scale. Can you describe what the noise would have to be like for you to be moderately annoyed by aircraft noise while you were here at the Big Dune Trail?
- ◇ Look at the number 4, which is labeled "very annoyed." How would this be different from moderately annoyed?
- ◇ Look at the number 5, which is labeled "extremely annoyed." How would that be different from very annoyed?

Interference Scale

- ◇ What score on the 1-5 interference scale did you choose for appreciation of the natural quiet and sounds of nature at the site? Why did you choose that score?
- ◇ What did the term "interference" mean to you when I asked if the sound from aircraft interfered with your enjoyment of the site?
- ◇ Earlier, I asked if you were bothered or annoyed by aircraft noise. How is this different, if at all, from aircraft noise interfering with your enjoyment of the site?

During the initial interviews conducted on April 28, it became apparent that the cognitive interview script, including all of the probes noted above, was too long for most respondents. Although respondents were willing to participate in the interview, their stop at the Big Dune Trail was only one of many planned activities for the day and, typically, they were trying to reach another destination by evening. As a result, for the majority of the respondents, the cognitive interview script was shortened to focus on the meaning of the phrase "natural quiet and the sounds of nature," as well respondents' interpretation of the terms "annoyance" and "interference" and the use of the annoyance and interference scales.

The results reported in here focus on those topics and questions that were discussed with all respondents. However, when appropriate or relevant, the results obtained with the subset of respondents who answered the long list of probes are also included.

8.3 Results

Interviews were completed with a total 21 individuals during the three-day period. A substantial proportion of the visitors for that period (perhaps as much as 50 percent) did not speak English as their first language. As a result, these visitors were not interviewed.

The results of the cognitive interviews should be interpreted as qualitative data, similar to the data that would be obtained from focus group interviews or in-depth interviews. In other words, these data should be viewed as an indicator of the range of opinions and views that exist in the population, not as an indicator of their relative prevalence in the population. For example, a correct interpretation would be as follows. If the cognitive interviews show that two-thirds of respondents feel that natural quiet is one of the most important attributes of their experience at White Sands N.M., and one-third feel it is less important than a number of other attributes, these data should be interpreted as indicating that both points of view are represented in the population of visitors. Incorrect interpretation would be that approximately twice as many visitors feel that natural quiet is an important attribute than feel it is a less important attribute of the experience. A larger-scale sample survey would be required to estimate the prevalence of either of these points of view in the population.

Hearing and Seeing Aircraft

Of the 21 completed interviews, 18 respondents recalled seeing or hearing one or more aircraft during the time they were on the Big Dune Trail. Because nearly all of the aircraft were military, and either taking off from or returning to Holloman AFB, the aircraft overflights at White Sands N.M. were very noticeable. Nearly all of the respondents who reported hearing or seeing aircraft were certain that they had seen or heard them. Most respondents reported seeing between one and three aircraft during the time they were on the Big Dune Trail.

Factors that Visitors Liked Most and Least About Their Hike on the Big Dune Trail

The purpose of this question in dose-response surveys is to determine if aircraft noise is one of the factors (either among those liked best or least) that comes directly to mind when respondents recall their experience. It is presumed that any mention of aircraft noise in response to this question, especially as a negative factor in their experience, would indicate that it is a significant problem. Aircraft noise was mentioned by only a small number of respondents as a negative factor in their experience at White Sands.

Interestingly, after the topic of aircraft noise was broached in the survey, several respondents indicated that, of course, aircraft noise had been a negative aspect of their experience. When the above open-ended question had been asked, respondents had assumed we were only interested in factors such as scenery, trails, wildlife, or weather, all of which were viewed in their mind as associated with the park or the experience. In effect, for these respondents, aircraft noise did not register as something the NPS would be interested in measuring or that should be considered as a factor in evaluating their experience.

Based on our discussions with these respondents, it is likely that more respondents consider aircraft noise a "top-of-the-mind" factor in evaluating their park experience than responses to this open-ended question indicate.

The Overall Enjoyment of the Big Dune Trail

Nearly all respondents indicated that the term "overall" referred to the sum total of all of the factors in their experience, such as the scenery, the condition of the trail (both positive and negative), and the weather. Again, however, it was apparent from comments provided later in the interview that aircraft noise was a factor that was simply not viewed as relevant to this discussion for a number of respondents.

Natural Quiet and the Sounds of Nature

All respondents indicated that experiencing natural quiet and the sounds of nature was a moderately to extremely important reason for visiting White Sands N.M. When asked about the meaning of the phrase "natural quiet and the sounds of nature," nearly all respondents concurred that this meant the absence of any man-made sounds, allowing us to hear nature as it is. The most frequently cited examples of the sounds of nature were wind, birds, and the rustling of leaves. A few respondents took the concept further, indicating that natural quiet and the sounds of nature is more than just the absence of man-made sounds, it implies a type of tranquility, such as "getting out of yourself" and being attuned to nature.

Based on these interviews it appears that the term "natural quiet and the sounds of nature" evokes a widely shared meaning to visitors - it is the absence of human-produced sounds.

Annoyance

As described above, a key objective of these cognitive interviews was to shed some light on the differences between the phrases "Were you bothered or annoyed by aircraft noise?" versus "Did the sounds from aircraft interfere with your enjoyment of the site?" To do this, we first asked respondents to describe their understanding of the individual terms (the order in which the phrases were introduced to the respondents was rotated to lessen any problems with order effect). We then asked respondents to describe how, if at all, these two phrases differed.

As expected, there was less shared agreement among respondents on what each of the two phrases meant. Being bothered or annoyed by aircraft noise was most often characterized as a distraction, something disturbing, an intrusion, or something that took your attention away from where you wanted it to be. Some respondents even used the phrase "interfere with what we are doing" to describe what being annoyed by aircraft noise would be like.

Two important dimensions were used in defining what it would be like to be bothered or annoyed by aircraft noise. One was the physical or emotional nature of the intrusion –it "upsets you," "turns you off," or "makes you wish it wasn't there." The second was the notion of a threshold. Merely being something that shouldn't be there wasn't enough to make something bothering or annoying, it had to <u>exceed</u> a certain level or number threshold before it could be classified as annoying. Respondents who cited this threshold dimension for bother or annoyance said it would have to be enough to make them actively wish it wasn't there or even make them angry ("make your blood pressure rise"), before they would classify it as annoying. The two dimensions appear to be related, because nearly all of the thresholds were described using the same terms, such as those used to describe the physical reactions.

Interference

The term "interference" was most often described as something that prevents you from doing what you want to do or makes it harder to accomplish what you are trying to do. Commonly cited examples of aircraft interfering with the enjoyment of the site were "interrupting my train of thought – it's a sound that shouldn't be there, but it's something that I have to put up with and it makes it harder to concentrate and experience all of the things that are here at White Sands." A few respondents cited aircraft noise interfering with hearing the trail guide being read aloud as another way in which aircraft noise interfered with their enjoyment of the site.

Interference with the appreciation of natural quiet and the sounds of nature was described as "It keeps me from being able to hear the wind, the birds, or things like that."

Differences Between Bothered or Annoyed and Interference

To further explore the differences in respondents' perceptions of the terms "being bothered or annoyed by aircraft noise" and "aircraft noise interfering with your enjoyment of the site," respondents were asked to compare and contrast their answers to the two questions, noting differences, if any, between the two phrases. A substantial majority of respondents indicated that they perceived a difference between annoyance and interference.

For most respondents, the difference follows logically from the definitions and descriptions described above. Interference is a more objective term indicating that something happened, for example, the respondent became distracted and was unable to concentrate or could not hear the sounds of the wind and the birds. The term "annoyance," on the other hand contains an evaluative component, for example, indicating that something was sufficiently troublesome to cause a negative reaction such as "making me mad," or "making me feel like doing something to get rid of the planes or whatever is causing the noise."

This majority opinion of the difference between annoyance and interference was summed up by one of the respondents when he said, "Interference is something that may happen for only a short period of time, keeping you from doing what you want to do. If the interference was highly noticeable and intrusive enough, it would make me annoyed." Another respondent also echoed the theme that interference can be a series of shorter or longer episodes, whereas annoyance is more a state of mind or an evaluation of the impact those episodes had on the respondent. "If I experience interference, it would be like keeping me from doing something, which could happen anywhere for just a moment or for a longer time. But if I was bothered or annoyed, it would be more serious. My blood pressure would go up. As a result, it would be a longer-lasting thing."

For these respondents, most likely representative of a majority of visitors to White Sands, it is clear that aircraft-noise interference can result in annoyance, but does not necessarily always do so. Some of these respondents indicated that because there was only one aircraft overflight, they experienced a brief period of interference, where they were distracted and prevented from listening to the wind, the birds, or the natural quiet. However, that one short period of interference was not sufficient to make them feel like they were bothered or annoyed by aircraft noise. To further explain this relationship, these respondents often suggested that if they had experienced additional aircraft overflights, they probably would have felt bothered or annoyed by aircraft noise.

For a small number of respondents, annoyance and interference appear to be similar concepts, These respondents used the same terms to describe both. For example, something "intruded," distracted them," or "disrupted" their experience. These respondents did not explicitly describe a physical dimension to being bothered or annoyed. As noted above, some respondents even used the term "interfere" to describe what would cause them to be bothered or annoyed. In discussing this issue with respondents, however, it appears that even respondents use the same words to describe each concept feel there is a difference, based on the degree of impacts. This viewpoint was summed up by one respondent when she said: "To me, being bothered or annoyed by aircraft noise means that it distracted me or interfered with what I was trying to do." Later, when asked if she perceived any difference between the two terms, she reported, "The interference [aircraft noise interfering with her enjoyment of the site] only happened occasionally. It was a distraction or a reminder of something other than what you are trying to do. The interference would have to be highly noticeable and happen enough to make me annoyed."

8.4 Implications for Respondents' Use of the Interference and Annoyance Scales

The analysis reported above indicates that interference and annoyance are related concepts. For most respondents, interference is viewed as a specific type of occurrence where the visitor is prevented or distracted from doing what they are trying to do. Annoyance, on the other hand, is more of a summary evaluative term, indicating that the interference (or other factors) were sufficient to cause the respondent to be upset, angry, or at least actively wish the aircraft were not present. In other words, interference can lead to annoyance, but does not always do so.

As a result, we would expect to find that measures of interference and annoyance have relatively high correlations, but do not approach a perfect correlation of 1.00. The correlation between these two measures will depend upon the amount of interference, as well as the importance of the specific attribute (such as natural quiet, cultural and historical significance of the area, etc.) to the respondent. In general, for the same level of aircraft exposure, we would expect measures of interference to show a higher level of impact than measures of annoyance.

Measures of interference should also be highly correlated but not perfectly correlated, depending upon their level of specificity. For example, interference with the appreciation of natural quiet and the sounds of nature is a measure of interference for one specific dimension of the experience. Interference with your enjoyment of the site is a more general measure that presumably encompasses the appreciation of the natural quiet plus other dimensions, such as the cultural and historical significance of the site, the scenery, etc. It is theoretically possible for interference with the appreciation of natural quiet and the sounds of nature to occur without interfering with the respondent's enjoyment of the site.

The relationship between these two measures will depend upon how important experiencing natural quiet and the sounds of nature is to the respondent's enjoyment of the site. If natural quiet is the major factor in enjoyment of the site, then we would expect these two measures to be highly correlated. If, however, appreciation of natural quiet and the sounds of nature is only one of a number of important factors in the respondent's enjoyment of the site, then the correlation between the two measures will be lower. For the same level of aircraft exposure, we would expect that a measure of interference with the appreciation of natural quiet and the sounds of nature would show a higher level of impact than interference with enjoyment of the site.

8.5 Conclusions

1. Aircraft noise appears to be a factor that visitors may not consider when asked to evaluate their park experience in an open-ended question format. As a result, open-ended questions, such as "What did you like the least about your visit to [Park]?" are probably not good indicators of the seriousness of problems from aircraft overflight noise at parks.

2. Visitors have a clear and widely shared understanding of the concept of "natural quiet and the sounds of nature." Natural quiet is viewed as the absence of any man-made sounds, allowing them to hear nature as it is.

3. Most visitors make a distinction between the terms "interference" and "annoyance." Interference is perceived as an objective term, describing something that prevents them from doing what they want to do; it is an interruption or a distraction. Annoyance is perceived as having an emotional, evaluative component. For example, many respondents associate a negative reaction "makes me mad," "causes my blood pressure to rise"- with the term annoyance.

4. Aircraft noise interference can result in annoyance but does not necessarily do so. The aircraft noise probably must exceed a certain level or number threshold before it is perceived as annoying.

5. Respondents indicate that interference can be a short-term occurrence, such that once the noise source has passed the perceived interference ends. Annoyance, however, because of the emotional component is more long-lasting. It seems reasonable to consider annoyance as the reaction that causes a visitor to evaluate the experience as negative or to consider registering a complaint.

APPENDIX A - SURVEY QUESTIONNAIRE

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VISITOR QUESTIONNAIRE

[INTERVIEWER READ THE INTRODUCTION]

Introduction

Hello. My name is *(INTERVIEWER NAME).* I am helping the National Park Service with a survey of visitors to *(NAME OF PARK).* The information visitors give us will help managers identify any problems in the park and enable them to better serve you. I would appreciate a few minutes of your time to answer some questions about your visit. Your participation in the survey is voluntary, and your answers are confidential.

[INTERVIEWER SAY: Now I would like to ask you a few questions about your visit.]

If No objection------------> *(CONTINUE)*

If Objection---------------> *(THANK INDIVIDUALS FOR THEIR TIME AND SELECT NEXT ELIGIBLE GROUP)*

Before we get started, I need to determine how long you have been at *(NAME OF SITE).* It is now *(GIVE EXACT TIME).* Do you remember what time you arrived at *(NAME OF SITE)*?

1 No------------> About how long have you been at *(NAME OF SITE)*? *(RECORD GROUP CONSENSUS ON GROUP COVER SHEET)*

2 Yes------------> *(RECORD GROUP CONSENSUS ON GROUP COVER SHEET)*

[INTERVIEWER: HAND OUT CLIPBOARDS AND ANSWER SHEETS.]

[INTERVIEWER SAY:"Do not discuss the questions or answers until the interview has been completed."]

1. This first question asks about your current visit to *(NAME OF PARK).* On what day and time did you start your visit to *(NAME OF PARK)*? *(FILL IN BLANK)*

Date: Month ______________________________ **Date** _____________

Time: __________ **a.m./p.m.**

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2. Is this your first visit to *(NAME OF PARK)* or have you visited the park before?

   1 First visit

   2 Visited park before ------------> Including this trip, approximately how many times have you visited *(NAME OF PARK)*?

   ________ **Total times**

3. The remaining questions ask about your visit to *(NAME OF SITE)*. Have you ever been to *(NAME OF SITE)* before? *(CIRCLE ONE NUMBER)*

   1 No

   2 Yes------------> For those who have been to *(NAME OF SITE)* before, including this time, about how many times have you visited this site in the past 5 years? *(FILL IN BLANK)*

   ________ **Total number of visits in past 5 years**

4. Overall, how enjoyable has your visit been to *(NAME OF SITE)* during this trip? Has your visit been not at all, slightly, moderately, very, or extremely enjoyable? *(CIRCLE ONE NUMBER)*

   1 Not at all enjoyable

   2 Slightly enjoyable

   3 Moderately enjoyable

   4 Very enjoyable

   5 Extremely enjoyable

5. What have you liked most while you were at *(NAME OF SITE)*? *(FILL IN BLANK)*

   ____

   ____

6. What have you liked least while you were at *(NAME OF SITE)*? *(FILL IN BLANK)*

   ____

   ____

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7. How important was each of the following reasons for visiting *(NAME OF SITE)*? Would you say that *(READ EACH REASON)* was not at all important, slightly, moderately, very, or extremely important for your visit. *(CIRCLE ONE NUMBER FOR EACH REASON)*

Would you say that. . .	**Not at All Important**	**Slightly Important**	**Moderately Important**	**Very Important**	**Extremely Important**
viewing the natural scenery was. . .	1	2	3	4	5
enjoying the natural quiet and sounds of nature was. . .	1	2	3	4	5
appreciating the history and cultural significance of the site was. . .	1	2	3	4	5

[INTERVIEWER SAY: "Next are two groups of questions about hearing and seeing aircraft at *(NAME OF SITE)*. First, I would like to ask some questions about hearing aircraft. Then I will ask about seeing aircraft."]

HEARING AIRCRAFT

8. Did you hear any airplanes, jets, helicopters, or any other aircraft during your visit to *(NAME OF SITE)*? *(CIRCLE ONE NUMBER)*

   1 No

   2 Yes

[INTERVIEWER SAY: "Questions 9 and 10 are only for those of you who heard an aircraft. The rest of you can wait until I read question 11."]

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9. Were you bothered or annoyed by aircraft noise during your visit to *(NAME OF SITE)*? Were you not at all annoyed, slightly annoyed, moderately annoyed, very annoyed, or extremely annoyed by aircraft noise? *(CIRCLE ONE NUMBER)*

   1 **Not at all annoyed**
   2 **Slightly annoyed**
   3 **Moderately annoyed**
   4 **Very annoyed**
   5 **Extremely annoyed**

10. How much did the sound from aircraft interfere with each of the following aspects of your visit at *(NAME OF SITE)*? Did the sound from aircraft interfere with your *(READ EACH STATEMENT)* not at all, slightly, moderately, very much, or extremely? *(CIRCLE ONE NUMBER FOR EACH STATEMENT)*

Did the sound from aircraft interfere with your. . .	**Not at All**	**Slightly**	**Moderately**	**Very Much**	**Extremely**
enjoyment of the site	1	2	3	4	5
appreciation of the natural quiet and sounds of nature at the site	1	2	3	4	5
appreciation of the historical and/or cultural significance of the site	1	2	3	4	5

SEEING AIRCRAFT

11. Did you see any airplanes, jets, helicopters, or any other aircraft during your visit to *(NAME OF SITE)*? *(CIRCLE ONE NUMBER)*

   1 **No**
   2 **Yes**

[INTERVIEWER SAY: "Question 12 is only for those of you who saw an aircraft."]

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12. For those who did see aircraft, were you bothered or annoyed by seeing aircraft during your visit to *(NAME OF SITE)*? Were you not at all annoyed, slightly annoyed, moderately annoyed, very annoyed, or extremely annoyed by seeing aircraft? *(CIRCLE ONE NUMBER)*

    1 Not at all annoyed
    2 Slightly annoyed
    3 Moderately annoyed
    4 Very annoyed
    5 Extremely annoyed

[INTERVIEWER SAY: "Question 13 is for those of you who either saw or heard an aircraft. If you did not see or hear any aircraft, please wait until I get to question 14."]

13. To the best of your knowledge, were the aircraft that you saw or heard today at *(NAME OF SITE)* primarily: *(CIRCLE ONE NUMBER)*

    1 Commercial aircraft flying passengers from one airport to another
    2 Military aircraft on training flights
    3 Sightseeing aircraft showing visitors the sights from the air
    4 General aviation or privately owned planes

[INTERVIEWER SAY: "Now I would like everyone to answer Question 14."]

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14. Do you remember seeing or hearing any information about aircraft that might fly over *(NAME OF SITE)* today? *(CIRCLE ONE NUMBER)*

1 No ------------> 14b. *IF INFORMATION TREATMENT GROUP, ASK:* Did you notice a sign at the trail head today telling you about aircraft you might hear or see while on the trail?

1 No
2 Yes ------------>14c. Did you read the sign?

1 No
2 Yes

2 Yes ------------> 14d. What was it that you saw or heard about aircraft?

1 Sign at trail head
2 Other *(specify)*

____

____

15. Is there anything else you would like to tell us about your visit to *(NAME OF SITE)? (FILL IN BLANK)*

____

____

***[INTERVIEWER:** INSTRUCT RESPONDENT TO COMPLETE THE BACKGROUND INFORMATION REQUESTED ON THE LAST PAGE OF THE ANSWER SHEET.]*

THANK YOU FOR YOUR HELP!

APPENDIX B - DETAILED DATA ANALYSIS

Appendix B. DETAILED DATA ANALYSIS

The complete set of resulting data for each White Sands visitor consists of:

- **Several types of doses**—each visitor's individual aircraft-sound dose while in the study area, measured by several different metrics,
- **Several types of responses**—each visitor's responses to aircraft sounds at the study area, determined by questionnaire, and
- **Many additional variables (mediators)**—additional information, specific to each visitor, that may influence the visitor's response to the dose received while in the study area.

Chapter 3 of this report includes a brief discussion of each dose, response and mediator, and Chapter 6 discusses how each was determined from the study's sound level data, observer logs, and visitor questionnaires. This appendix describes how these visitor data were converted into dose-response relationships. Each dose-response relationship allows the prediction of one type of visitor response from one type of dose, taking into account both the dose and the mediators that significantly influence response.

Overview. Section B.1 summarizes the relationship between individual visitor data (351 valid values of dose and response) and the dose-response relationships that result from these visitor data. As part of this overview, a dose-response curve and its use are described.

Method. Section B.2 lists all doses, responses and mediators in the study and then discusses which dose/response pairs and which dichotomies were selected for analysis. Section B.3 describes the dose-response analysis, itself, which produced the study's four dose-response relationships.

Results. Section B.4 presents the four resulting dose-response relationships:

- Annoyance vs. percentage of time that aircraft are audible,
- Interference with natural quiet vs. percentage of time that aircraft are audible,
- Annoyance vs. relative sound level (aircraft L_{eq} minus background L_{eq}), and
- Interference with natural quiet vs. relative sound level (aircraft L_{eq} minus background L_{eq}).

These relationships consist of the dose-response equations that predict visitor response from visitor dose and mediating variables. Section B.4 also describes the use of these four dose-response relationships, and cautions the reader about their applicability.

B.1 Overview: Relationship Between a Dose-Response Curve and Its Underlying Data

Figure B.1 illustrates the relation between a dose-response curve and its underlying data. In the figure, the particular dose (for example, relative sound level) is not specified, nor is the particular response (for example, annoyance).

Frame A: Individual Visitor Data. In Frame A of the figure, each visitor's dose and corresponding response is plotted as a circle, which is located horizontally at the visitor's individual dose while in the study area and vertically at the visitor's response to one of the survey questions. The possible responses to that question are listed along the left axis of the graph: **Not at all**, **Slightly**, **Moderately**, **Very much**, and **Extremely**.

For example, the top-most cluster of circles in Frame A are for visitors who responded **Extremely** to the question. The cluster's circles are jittered (vibrated) up and down. The vertical spread that results from this jittering has no real meaning, however. It serves only to minimize the overlap of circles and their occlusion of each other within the cluster. Jittering of the circles within each cluster allows the density of circles and their horizontal distribution within the cluster to be seen more easily.

The circles in Frame A show a general trend from lower left to upper right. In words, the severity of response (vertical position) tends to rise with increasing dose (horizontal position).

Frame B: Dichotomized. In Frame B, the five possible responses are dichotomized (split) into two categories, between the response **Moderately** and the response **Slightly**. All responses above this split point appear in the top cluster in this frame. All responses below the split point appear in the bottom cluster. Dichotomization is necessary if the data are to provide a useful answer to the question: How many visitors are impacted? If no dichotomization were used, the data would provide five answers for any dose. The data would tell how many people were not at all impacted, how many were slightly impacted, etc. The dichotomization provides a single number of impacted visitors for each dose, and provides results that are far easier to use in decision making.

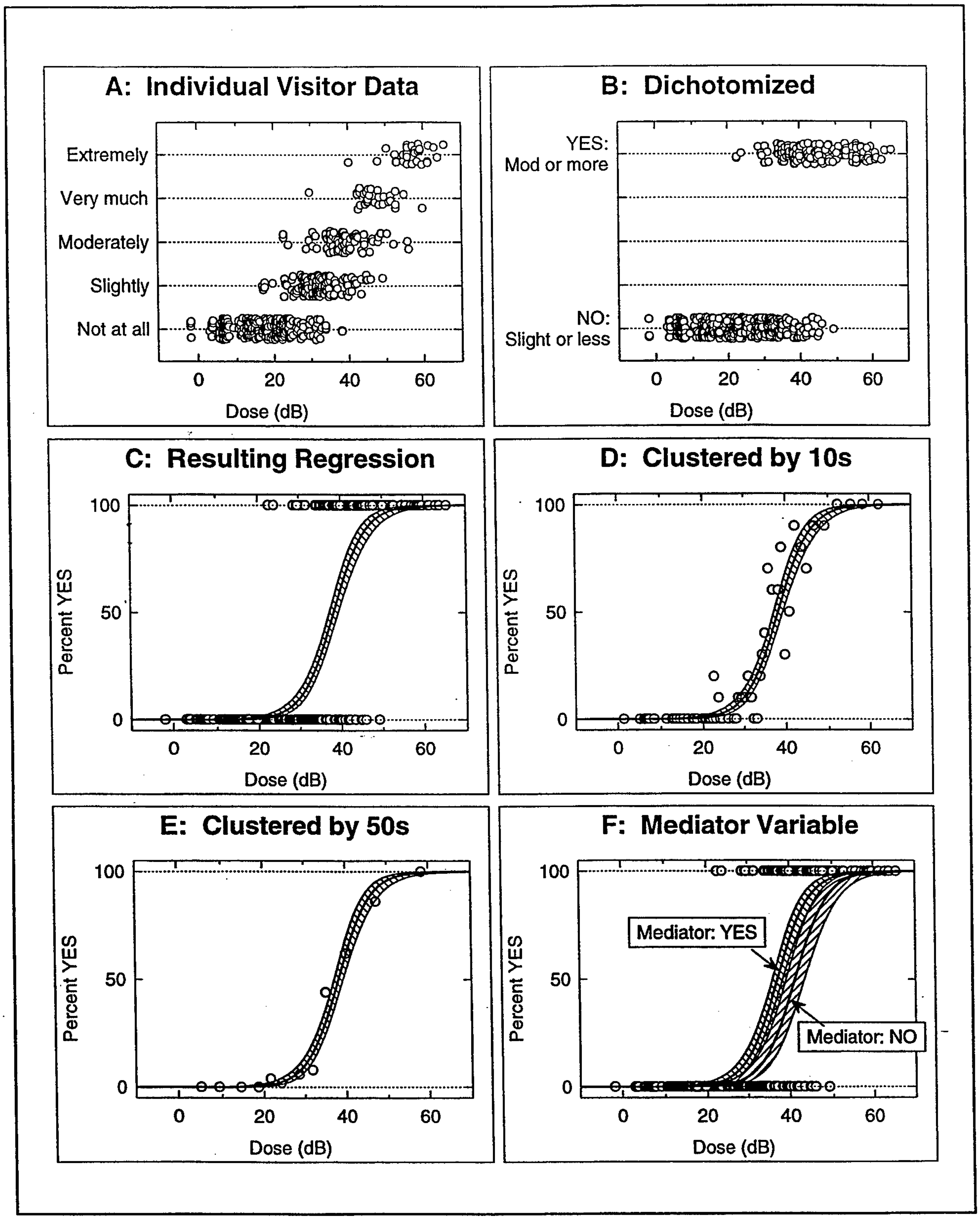

Figure B.1. Relationship between a Dose-Response Curve and Its Underlying Data

For simplicity in the discussion that follows, the top cluster after dichotomization is labeled YES and the bottom cluster is labeled NO. The actual meaning of YES and NO depend upon the split point used to dichotomize the responses. In this example, the YES cluster contains the top three responses: **Moderately, Very much,** and **Extremely.** The NO cluster contains the bottom two responses: **Slightly** and **Not at All.** Therefore, YES means "moderate effect or more." NO means "slight effect or less."

Three other dichotomizations are also possible: (1) split between **Extremely** and **Very much,** (2) split between **Very much** and **Moderately,** and (3) split between **Slightly** and **Not at All.** These other dichotomizations would result in a different split of visitor data between the YES and NO clusters, and therefore a different meaning of the terms YES and NO.

Frame C: Resulting Regression. In Frame C, a numerical scale is added to show the percentage of YES visitors. In addition, the YES cluster of circles is replotted at "100 percent YES" and the NO cluster at "0 percent YES"—both without jitter. Without jitter, note that the density of circles and their horizontal distribution is not nearly as clear as in Frame B, even though these are the same circles, one per visitor, in the same horizontal positions.

Frame C also contains the dose-response curve that results from these circles, plus a region of certainty around the dose-response curve. This dose-response curve answers the following question: "If a large number of visitors are exposed to a particular aircraft-sound dose, what percentage of them will be YES visitors—that is, visitors who will experience a moderate effect or more?

For example, if a large number of visitors are exposed to 40 decibels of this type of dose, the curve predicts that approximately 60 percent of them will be YES visitors. This 60 percent is not known with absolute certainty, however. With 90-percent certainty, the percentage actually will lie somewhere between 52 and 68 percent, the edges of the region of certainty.

Certainty is never absolute in any study that starts with sampled data. The more samples in the study, the greater will be the certainty in its resulting dose-response curves. In addition, certainty will be greater for some dose-response pairs than for others; it will be greater when the chosen dose strongly influences the chosen response. Also, for any particular dose-response curve, certainty will be greater in regions where most of the study's data lie—generally towards the center of the curve. Both the dose-response curve and its region of certainty in this frame result from "logistic" regression on the visitor circles. Logistic regression is described in Section B.3.

As is apparent in Frame C, the dose-response curve does not pass directly through the data that produced it—which all lie either at zero or 100 percent. For this reason, the visual fit of the curve to the data is not at all clear in this frame. The remaining frames of the figure are meant to clarify the relationship between the curve and the data, to make this relationship seem reasonable and more understandable.

Frames D and E: Clustered circles. In Frame D, the individual visitor circles are averaged, ten visitors each. The ten circles with the lowest doses are averaged first, resulting in a dose average of approximately +1 decibel and a response average of zero percent. Then the next ten lowest doses are averaged, then the next, and so forth. The resulting "clustered" circles show a lower-left-to-upper-right pattern.

In Frame E, visitor averaging continues, with an increasing number of visitors (50) averaged into each circle. The lower-left-to-upper-right pattern is especially clear in this frame, where the pattern of averaged circles clearly hugs the dose-response curve. The visual fit of the circles to the dose-response curve becomes better and better, the greater the number of visitors averaged together into each circle.

This visitor averaging is meant to clarify the relationship between the dose-response curve and the data that produced it. However, data averaged over visitors contain less information than do the full set of data circles, one per visitor. The specific values of each visitor's dose have been averaged out. For example, the left-most circle in Frame E represents 50 visitors at an average dose of +2.5 decibels. The specific values of each visitor's dose represented by this circle range from -3 to +7 decibels, but this detailed information was lost through averaging. Because averaged information is not complete, the dose-response curve is computed from the full set of original data, one circle for each visitor, as discussed for Frame C.

The averaged circles can also clarify the region of certainty, to help make it more plausible. In Frame D, approximately 40 percent of the circles fall within the region of certainty. This increases to approximately 70 percent for Frame E. The more visitors averaged into each circle, the greater the percentage of these circles that fall within the region of certainty. If the measured set of data were very much larger, the averaging could be continued further—with 100, then 200, then 500, then 1000, then even 10,000 visitors per circle. With increasing numbers of visitors per circle, the percentage of these circles that fall within the region of certainty would eventually reach 90 percent. That is the meaning of the region of certainty and the mathematics that underlies it. As a result, when the dose-response curve is used to predict response in the future, it says the following: "Of a very large number of visitors receiving a particular dose, the curve and its region of certainty will predict the percentage of YES visitors for that particular dose—with 90-percent certainty."

Frame F: Mediator Variable. To produce Frame F, an illustrative mediator variable was entered into the regression. The regression computer program then fits the data with separate dose-response curves, as shown on the graph. These two curves are identical in shape, but displaced horizontally from one another. This horizontal displacement is the dose change that would produce the same effect as the mediator. In addition, the regions of certainty are somewhat broader in this frame than in Frame E, because fewer visitors contribute to each curve here than to the curve in Frame E.

The overview in this section was meant to clarify the relationship between individual visitor data and their resulting dose-response curve. The actual method used to develop dose-response relationships is the subject of the following two sections.

B.2 Selection of Doses, Responses, and Dichotomizations for the Analysis

Table B.1 contains the complete list of the study's variables—doses, responses and mediators. In addition, the table shows the source of each variable. Chapter 3 of this report includes a brief discussion of each variable and Chapter 6 discusses how each was determined.

All 6 possible doses, combined with the two possible responses, would result in a total of 12 dose-response relationships. It was not possible or considered useful to develop this many relationships as part of the study. In addition, it was not possible to analyze all potential dichotomizations of responses and mediators. For these reasons, doses and responses were chosen and dichotomizations were decided through consultation with the USAF prior to data analysis. This section discusses these decisions and the reasoning behind them.

Table B.1. Complete List of Variables: Doses, Responses and Mediators

VARIABLE	SOURCE
DOSES	
Non-acoustical doses	
Percent time aircraft audible	Aircraft log
Number of audible aircraft events	Aircraft log
Aircraft sound, alone	
Aircraft L_{max} (maximum A-weighted sound level)	Monitor
Aircraft L_{eq} (equivalent sound level)	Monitor
Aircraft SEL (Sound Exposure Level)	Monitor
Relative sound level (aircraft sound minus background sound)	
Aircraft L_{eq} minus background L_{eq}	Monitor
RESPONSES	
Annoyance due to aircraft sound	Question 9
Interference with appreciation of Natural Quiet and sounds of nature	Question 10
MEDIATORS	
Trailhead sign: "Military aircraft can regularly be seen and heard on this walk."	
Information about aircraft flights in the area (visitor remembers seeing the trailhead sign, or seeing/hearing other information about military aircraft in the area)	Question 14
Visitor remembers seeing the trailhead sign, itself	Question 14
Trailhead sign posted, whether or not the visitor remembers it	Observer log
Grouping together of aircraft flights	
Number of audible aircraft events, combined with percent time aircraft audible	Monitor
Number of audible aircraft events, combined with relative sound level	Monitor
Aircraft L_{eq} combined with percent time aircraft audible	Monitor
Percent time aircraft audible, combined with relative sound level	Monitor
Aircraft-related	
Overhead flights, or not	Observer log
Closest-aircraft distance (any effect beyond dose, alone?)	Photos
Closest-aircraft SEL (any effect beyond dose, alone?)	Monitor
Aircraft L_{max} (any effect beyond dose, alone?)	Monitor
Aircraft L_{eq} (any effect beyond percent time aircraft audible, alone?)	Monitor
Visitor-related: Importance of reasons for visiting	
Importance of Natural Quiet and sounds of nature	Question 7
Importance of scenery	Question 7
Importance of history/cultural aspects of site	Question 7
Visitor-related: Other	
Gender	Observer log
Age	Observer log
Children in group, or not	Observer log
Time of visit (am or pm)	Observer log
Number of adults in group	Observer log
First visit to site, or not	Question 2
Other	
Background L_{eq}	Monitor
Specific date of visit	Observer log
Specific interviewer	Observer log

Italics show those variables in the final dose-response relationships.

B.2.1 The Two Chosen Doses

The doses in Table B.1 are of three types:

- **Non-acoustical doses**—doses that involve aircraft counts and stop-watch timings, which therefore can be measured without acoustical instruments,
- **Aircraft sound, alone**—doses that involve acoustical measurements of aircraft sound, alone, and
- **Relative sound level (aircraft sound minus background sound)**—relative doses that involved acoustical measurements of both aircraft sound and background sound.

The two chosen doses and the reasons for their choice are discussed in the remainder of this section.

First chosen dose: Percentage of time that aircraft are audible (to an intent listener). This dose was used for several reasons. First, the previous NPS work[1] demonstrated that it correlates well with visitor responses. Second, it may be easily and inexpensively measured with a stop-watch, without use of acoustical instruments, by personnel with very little training. Thus, with relatively little effort, it may be determined at a park location and compared with the dose-response curves, if applicable. Third, it corresponds well with the concept of natural quiet, one of the resources the National Park Service is charged with preserving. When aircraft are audible, natural quiet is lost. Finally, decision makers, faced with deciding how much aircraft (or other) noise is acceptable, can readily imagine what it might be like to be able to hear aircraft a given percent of the time. They need not understand decibels.

Second chosen dose: Relative sound level (aircraft L_{eq} minus background L_{eq}). The aircraft L_{eq} portion of this dose is used because it is comparable to metrics traditionally used by the Department of Defense, the Federal Aviation Administration, the Department of Housing and Urban Development, and the Environmental Protection Agency. This type of metric has "standing" within the federal government and in the acoustics literature for the assessment of aircraft sound.

In addition, the L_{eq} metric is the one commonly produced by most noise prediction computer programs, and measured by most standard sound monitoring instruments. Thus, these standard methods could be used to provide the sound level information necessary for appropriately modeling aircraft sound levels and applying the dose-response curves to the results.

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1 Anderson, *et al. Dose-Response Relationships Derived from Data Collected at Grand Canyon, Haleakala and Hawaii Volcanoes National Parks,* October 1993, HMMH Report No. 290940.14, NPOA Report No. 93-6.

The relative sound level was chosen—instead of simply the aircraft L_{eq} —for several reasons. First, initial work (see Appendix J of reference in footnote 1) showed that using this difference between aircraft sound and background sound tended to "collapse" the dose-response curves from different locations. That is, using the difference metric moved the curves toward each other, thus strongly suggesting that differences from site to site in dose-response could be partly accounted for by the concept that intrusion of aircraft relative to background sound plays an important role in determining visitor response.

Second, from an intuitive perspective this intrusion concept also is reasonable. A given level of aircraft sound (L_{eq}) is likely to be more noticed or more annoying at a quiet site than at a site with a high level of background sound.

Third, it is good practice to have the dose-response curves dependent upon the local sound environment. History has shown that, no matter what detailed caveats are placed on research results, the results are often applied to situations where their applicability is questionable, if not incorrect. Including the effects of the background sound levels will help control the use of the results. For example, if someone applies these White Sands results to a community park in a suburban or urban area, the higher background levels likely at such sites will automatically and appropriately reduce the indicated effects of intruding aircraft noise.

In any case, sound-level doses are highly correlated with one another (see Appendix C). Because of this high correlation, these dose metrics "track" one another very well for this study's data. For that reason, if one of them is known for a particular visitor, the others can be estimated quite precisely, as well. Because of this high correlation, only one sound-level dose was included in the analysis. Others would be redundant.

B.2.2 The Two Chosen Responses

The questionnaire contained four questions or subquestions that asked for visitor response (see Appendix E) each about a different aspect of visitor reaction to aircraft sounds. Although all visitor reactions to aircraft sound are of general interest, the responses of most interest, jointly to the USAF and the National Park Service, were chosen for analysis. The two chosen responses and the reasons for their choice are discussed in the remainder of this section.

First chosen response: Annoyance due to aircraft noise. The question asked of park visitors was: "Were you bothered or annoyed by aircraft noise during your visit to Big Dune Trail?" The response to this question was chosen because it is the response currently in use by the

Environmental Protection Agency and the Federal Aviation Administration to assess sound in residential communities. In brief, this response has "standing" within the federal government and in the acoustics literature for the assessment of the effects of all types of sounds in the community, including those from aircraft.

Second chosen response: Interference with appreciation of Natural Quiet and sounds of nature. The question asked of park visitors was: "Did the sound from aircraft interfere with your appreciation of the natural quiet and sounds of nature at the site." The response to this question was chosen because natural quiet is one of the resources the National Park Service is charged with preserving within national parks.

B.2.3 The Chosen Response Dichotomizations

Dichotomization was needed for the chosen responses because they each have five options on the questionnaire:

- **Extremely**
- **Very much**
- **Moderately**
- **Slightly**
- **Not at all**

The chosen responses were dichotomized between **Slightly** and **Moderately**. By this dichotomization, YES visitors will be those who answered **Extremely, Very much,** or **Moderately.** NO visitors will be those who answered **Slightly** or **Not at all.**

The chosen dichotomization was preferable to the two possible dichotomizations further *up* the response scale because those two dichotomizations have been judged by the National Park Service to not sufficiently protect visitor experience. The National Park Service states that it wishes to provide a *quality* environment for visitors, rather than just a *bearable* environment. In the other direction, the chosen dichotomization was preferable to the dichotomization further *down* the response scale, between **Not at all** and **Slightly,** because the "Slightly" response was judged likely to be rather unstable—that is, too variable and too arbitrarily chosen by an interviewee. Such a dichotomization includes in the YES group those visitors who responded **Slightly.** Any attempt to substantially reduce the number of visitors who are only "slightly" affected would be likely to restrict aircraft activity unreasonably, while achieving only minimal additional benefit to visitors.

B.2.4 The Chosen Mediator Dichotomizations

Some mediators have more than two possible values, as well. For some of these mediators, it was desirable to retain all possible values in the analysis. On the other hand, the three "importance" mediators (concerning natural quiet, scenery and history/culture) have the following scale-like options on the questionnaire:

- **Extremely**
- **Very much**
- **Moderately**
- **Slightly**
- **Not at all**

These three mediators were dichotomized between **Moderately** and **Very Much.** By this dichotomization, natural quiet (or scenery, or history/culture) was a very or extremely important reason for visiting, for YES visitors, and moderately or less important for NO visitors.

B.3 The Dose-Response Analysis

This section describes the study's dose-response analysis, which used "logistic" regression to produce four dose-response relationships. Figure B.2 shows a sample dose-response curve, with two values of a mediating variable. This figure serves to illustrate the reasons for choosing logistic regression. The following features of this sample dose-response curve are important:

- Dose-response curves approach zero percent for very low doses and sometimes increase toward 100 percent for very high doses. They never go below zero nor above 100 percent.

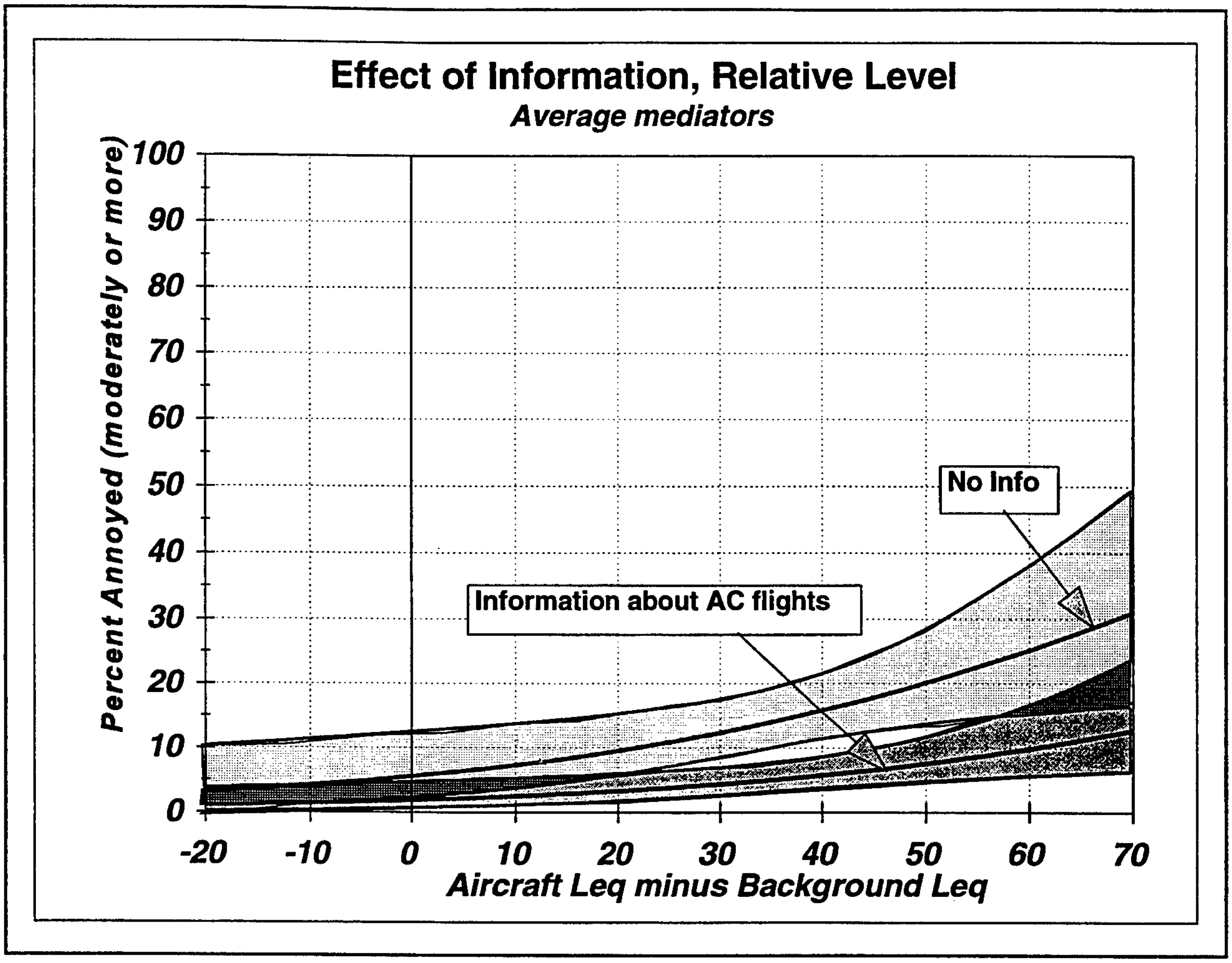

Figure B.2. Sample Dose-Response Curve

- Dose-response curves are flanked by regions of certainty, which also never go below zero nor above 100 percent. These regions of certainty widen where data are scarce (towards the right in the figure). However, as dose-response curves approach zero or 100 percent, these regions of certainty generally narrow down again. This narrowing is expected because (1) for extremely low doses that cannot be heard by the visitor, response would be essentially zero, with little uncertainty, and (2) for extremely high doses, it is possible that nearly all visitors would express an "extreme" response, again with little uncertainty. Regions of certainty are discussed in more detail in Appendix D.
- Dose-response curves are determined by the full set of data points, which all lie either at zero percent or at 100 percent, rather than by averaged data points that have lost some detailed information about individual visitors.

"Logistic" regression results in curves with all of these features, because that type of regression was designed for exactly this type of data: all data values are either zero percent (NO) or 100 percent (YES). Logistic regression was therefore chosen for use in this study.[2]

Figure B.2 also illustrates the effect of one mediator upon the dose-response relationship. It shows that "information about aircraft flights in the area" modifies the effect of relative sound level. For example, when aircraft information is not remembered by the visitor (upper curve), about 10 percent of visitors express annoyance at a relative sound level of 20 dB. On the other hand, when such information is remembered (lower curve), then a relative sound of 60 dB is needed to annoyance this same 10 percent of visitor. Information has made visitors far less sensitive to the sound level. Logistic regression determines the magnitude of this trade-off between dose and mediator, and results in two curves that are identical in shape but shifted horizontally by this dose tradeoff.

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2 The most common type of regression is least-squares regression. Least-squares regression could produce the same shape curve as used for logistic regression, approaching zero percent to the left and 100 percent to the right. However, regions of certainty for least-squares regression widen drastically to the left and right of the field of data, and therefore would inevitably extend below zero percent and above 100 percent—to the left and right, respectively.

Before the refinement of computer programs for logistic regression, extensions below zero and above 100 percent were avoided in least-squares regression by clever mathematical transformation of response. However, least-square results with such transformations were always somewhat in doubt where the resulting curve predicted less than 10 percent or more than 90 percent response. The basic problem is this: the mathematics of least-squares regression assumes a particular probability distribution of the underlying data, and data of the type in this study severely violate this assumption. In addition, least-squares regression for this type of data requires an averaging over visitors, which loses information about individual visitor doses. Since the refinement of computer programs for logistic regression, least-squares regression is rarely used for data of this type.

The remainder of this section describes the logistic regression that was conducted for the four chosen dose-response relationships:

- Annoyance vs. percent time audible
- Annoyance vs. relative sound level
- Interference with natural quiet vs. percent time audible
- Interference with natural quiet vs. relative sound level

B.3.1 Steps in the Logistic Regression Analysis

This section describes each step of the study's logistic regression analysis. It is intended for the relatively technical reader. It is meant to contain enough detail to assure such a reader that the analysis was appropriate and sufficiently complete. Without loss of continuity, this section can be skipped by readers interested primarily in the study's results. Discussion of those results and their use begins on page B-24.

The study's logistic regression analysis is based in great measure upon [Hosmer 1989][3] and [Collett 1991].[4] Figure B.3 summarizes the steps of this analysis and is useful as a guide to the discussions that follow. The figure also indicates where the results of this analysis can be found.

Step 1: Summarize missing data. In total, simultaneous dose and response data were obtained for 351 park visitors. Ideally, each dose-response relationship would be based upon the individual dose and responses of all 351 visitors. However, sometimes a visitor's dose could not be adequately measured. In addition, sometimes a particular response to aircraft sound or a particular opinion about a mediator was not entered on the visitor's questionnaire. Table 7.6 in the main body of the report summarizes missing data and the decisions that were made about the data used in the analysis.

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3 Hosmer, David W. and Stanley Lemeshow. *Applied Logistic Regression.* New York, NY : John Wiley & Sons, 1989.

4 Collett, D. *Modelling Binary Data.* London : Chapman & Hall, 1991.

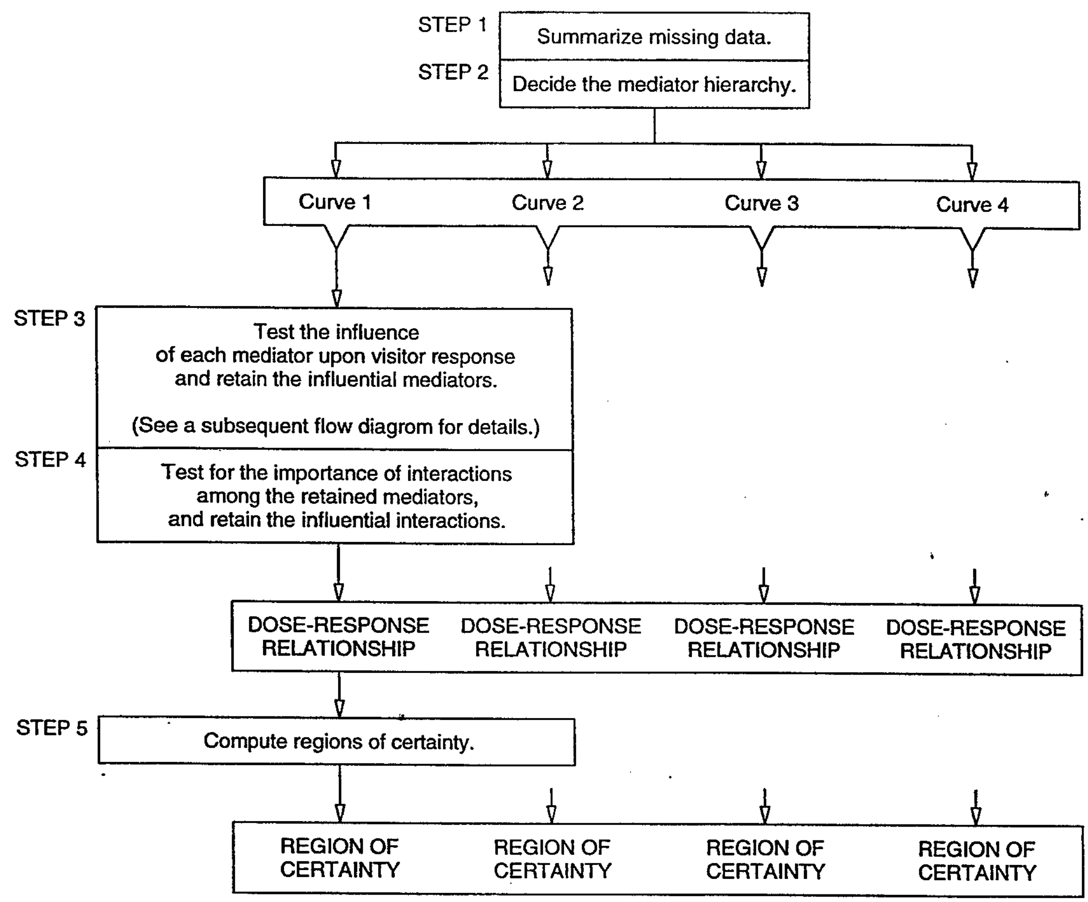

Figure B.3. Steps in the Regression Analysis

As that table suggests, no attempt was made to recover missing data—dose, response or mediator.[5] Instead, visitors were excluded from any particular computation in which the missing data were needed. For example, visitors missing a particular mediator were excluded when that mediator was being investigated for inclusion in a dose-response relationship. However, if that mediator was dropped from consideration, then that visitor was re-included in subsequent computations.

Step 2: Decide the mediator hierarchy. During development of each dose-response relationship, each mediator was tested to see how much it influenced visitor response. If influence was significant, the mediator was included in the dose-response relationship as an adjustment to the dose-response curve. Mediators tested first had a greater chance of being included than those tested later in the analysis.

Four preliminary investigations were undertaken to help decide upon a testing order for mediators—that is, a mediator hierarchy. First, selected distributions of doses, responses and mediators were computed and tabulated.

Second, the various interrelationships among mediators were further examined to spot potential effects of one mediator upon another. For example, visitor groups with children might be less likely to have an historical/cultural agenda for their visit than would groups without children. Such potential interrelationships are important to the mediator hierarchy for the following reason: mediators that affect others are best tested first, so that they have a greater chance of being accepted into the final regression equation. Thereby, acceptance would favor influential mediators over ones that they potentially affect.

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5 Possible recovery techniques include (1) substitution of the mean, (2) the Hot Deck Method, (3) imputation from randomly selected individuals, (4) subjective regression, and (5) objective regression [Section 13.5 of Levy, Paul S. and Stanley Lemeshow. *Sampling of Populations: Methods and Applications.* New York, NY : John Wiley & Sons, 1991]. The first four of these possibilities have serious technical deficiencies, especially as they affect the computation of regions of certainty. The last of these techniques overcomes most deficiencies, but is very laborious. None were used in this study.

Figure B.4 contains a sketch of all mediators and their potential interrelationships. In the figure, arrows are drawn from influential mediators to ones that they potentially affect. Note that the interrelationships in this figure are speculative. Some of them even proceed in both directions—for example, one arrow proceeds from "number children" to "importance of natural quiet" and a second arrow proceeds in the opposite direction, from "importance of natural quiet" to "number children."[6]

As the third preliminary investigation, correlation coefficients were computed between all pairs of the study's mediators. These correlation coefficients appear in Appendix C. Numerical correlations among mediators are potential pitfalls in the regression mathematics, because the acceptance of two correlated mediators into the regression would result in inaccurate regression coefficients for each mediator. As described below, the regression procedure tested for such inaccuracy before accepting mediators. The computed correlation coefficients provided an early warning for such occurrences. This potential difficulty was postponed until later, rather than earlier, in the regression procedure by relegating one of each pair of highly correlated mediators further towards the bottom of the hierarchy.

---

6 Number of children may influence importance of natural quiet. Parents bringing children to the study area might be *less* likely to seek natural quiet during their visit, because they realize they have brought their children and therefore have little chance of experiencing natural quiet. Or perhaps living with children at home might *increase* their basic need for natural quiet, since they get so little at home. They may therefore have come to the site seeking much-needed natural quiet, in spite of bringing their children with them. For both these possible situations, the "children" mediator is influencing the "natural quiet" mediator. One of the arrows in the figure shows the dependency in this direction: from "number children" to "importance of natural quiet."

On the other hand, importance of natural quiet may influence number of children. The parents' need for natural quiet might cause them to leave their children at home. In this case, "importance of natural quiet" is influencing "number children." The figure contains an arrow in this opposite direction, as well.

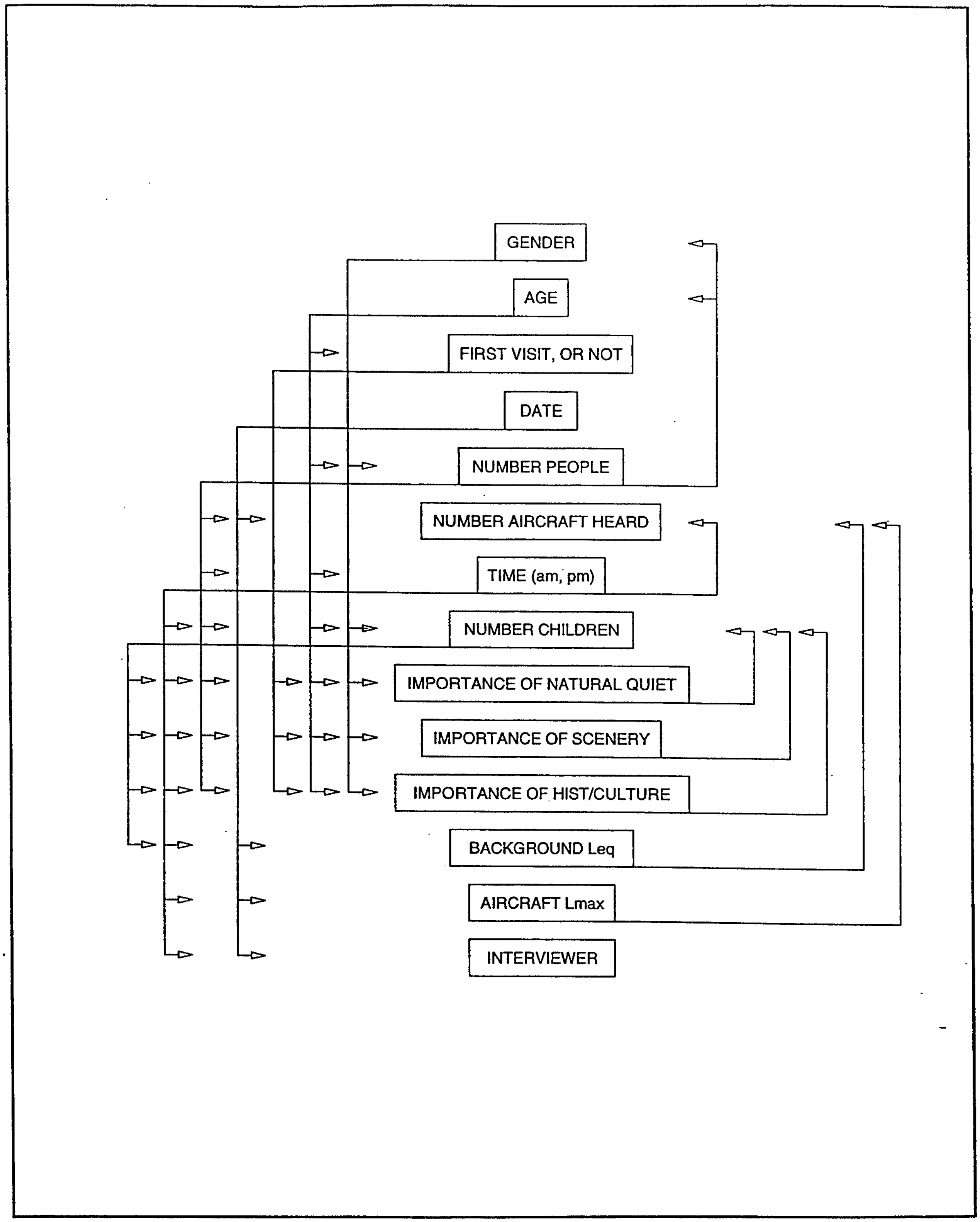

Figure B.4. Potential Interrelationships among Mediators

As the fourth preliminary investigation, logistic regressions were performed to determine the relative influence of each mediator upon response, plus changes in each mediator's regression coefficient as other mediators were added to the regression. In addition to providing insight about the mediator hierarchy, these regressions highlighted mediators that might be potential problems during the full regression procedure, as mediators are formally tested for inclusion.

The final mediator hierarchy resulted from a combination of the results of these four preliminary investigations. This final hierarchy appears in Table B.2, along with decisions about the use of each mediator during regression.

Step 3: For each dose-response relationship, test the influence of each mediator upon visitor response and retain the influential mediators. Starting at this point in the analysis, each step was performed four times: once for each of the four dose-response relationships. First, each mediator was tested for its influence on visitor response, in the priority hierarchy of Step 2.

The testing procedure is summarized in Figure B.5. First, if inclusion of the mediator caused the omission of many visitors from the regression, because they lacked a value for this mediator, then that mediator was dropped from further consideration.

Second, a logistic regression was computed with the tested mediator added as a variable, in addition to the dose and those mediators already accepted for inclusion in the dose-response relationship. This logistic regression resulted in a regression coefficient for each of the variables, plus several diagnostic numbers computed by the logistic regression software. One of these diagnostic numbers indicated how much the tested mediator "explained" the remaining variability in response—that is, the variability not explained by the dose or by mediators previously included. If the tested mediator did *not* explain a significant amount of this remaining variability, then it was dropped from further consideration.[7]

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[7] In technical terms, as each mediator was added to the analysis, its G-statistic was computed relative to the previous nested model. This G-statistic was then compared to the Chi-squared distribution for the number of degrees of freedom eliminated by the mediator under test. A 10-percent level of significance was used to judge inclusion for mediators. In other words, chances are 90 percent or greater that the mediator truly influences visitor response.

Table B.2. Hierarchy for Testing Mediators

MEDIATOR	TYPE OF MEDIATOR	USE OF MEDIATOR DURING REGRESSION	ORDER OF TEST
Overhead flights with some stealth aircraft, OR overhead flights with no stealth aircraft, OR no overhead flights	Other aircraft factor	Normal use	1
Overhead flights OR did not	Other aircraft factor	Tested if coefficients for the previous mediator showed no apparent difference between the two types of overhead flights.	2
Remembered NPS sign, OR remembered some other information about aircraft flights in the area, OR not	Information	Normal use	3
Remembered information about aircraft flights in the area OR did not	Information	Tested if coefficients for the previous mediator showed no apparent difference between the two types of information.	4
NPS sign about aircraft was posted, OR not	Information	Sometimes tested as a possible alternative to the two previous mediators.	5
Closest-aircraft distance	Other aircraft factor	Any effect beyond dose, alone?	6
Closest-aircraft SEL	Other aircraft factor	Any effect beyond dose, alone?	7
Aircraft L_{eq} for time dose OR percent time aircraft audible for relative sound-level dose	Aircraft grouping	This dose-like mediator will change independent of the regression's dose, as a function of aircraft spacing. Any effect?	8
Gender	Visitor factor	Normal use	9
Age	Visitor factor	Normal use	10
First visit to study area OR not	Visitor factor	Normal use	11
Children in group OR not	Visitor factor	Normal use	12
Two or more adults in group OR not	Visitor factor	Normal use	13
Number of aircraft events heard by attentive listener	Aircraft grouping	This dose-like mediator will change independent of the regression's dose, as a function of aircraft spacing. Any effect?	14
Time of visit (am or pm)	Visitor factor	Normal use	15
Importance of reasons for visiting: Enjoying natural quiet and sounds of nature	Visitor factor	Normal use	16
Importance of reasons for visiting: Viewing natural scenery	Visitor factor	Normal use	17
Importance of reasons for visiting: Appreciating history and cultural significance	Visitor factor	Normal use	18
Aircraft L_{max}	Other aircraft factor	Any effect beyond dose, alone?	19
Specific date of visit	Visitor factor	Test to see if any other variations from day to day are likely to have affected the regression.	20
Specific interviewer	Other	Test to see if actions/expressions of the interviewer are likely to have affected the regression.	21

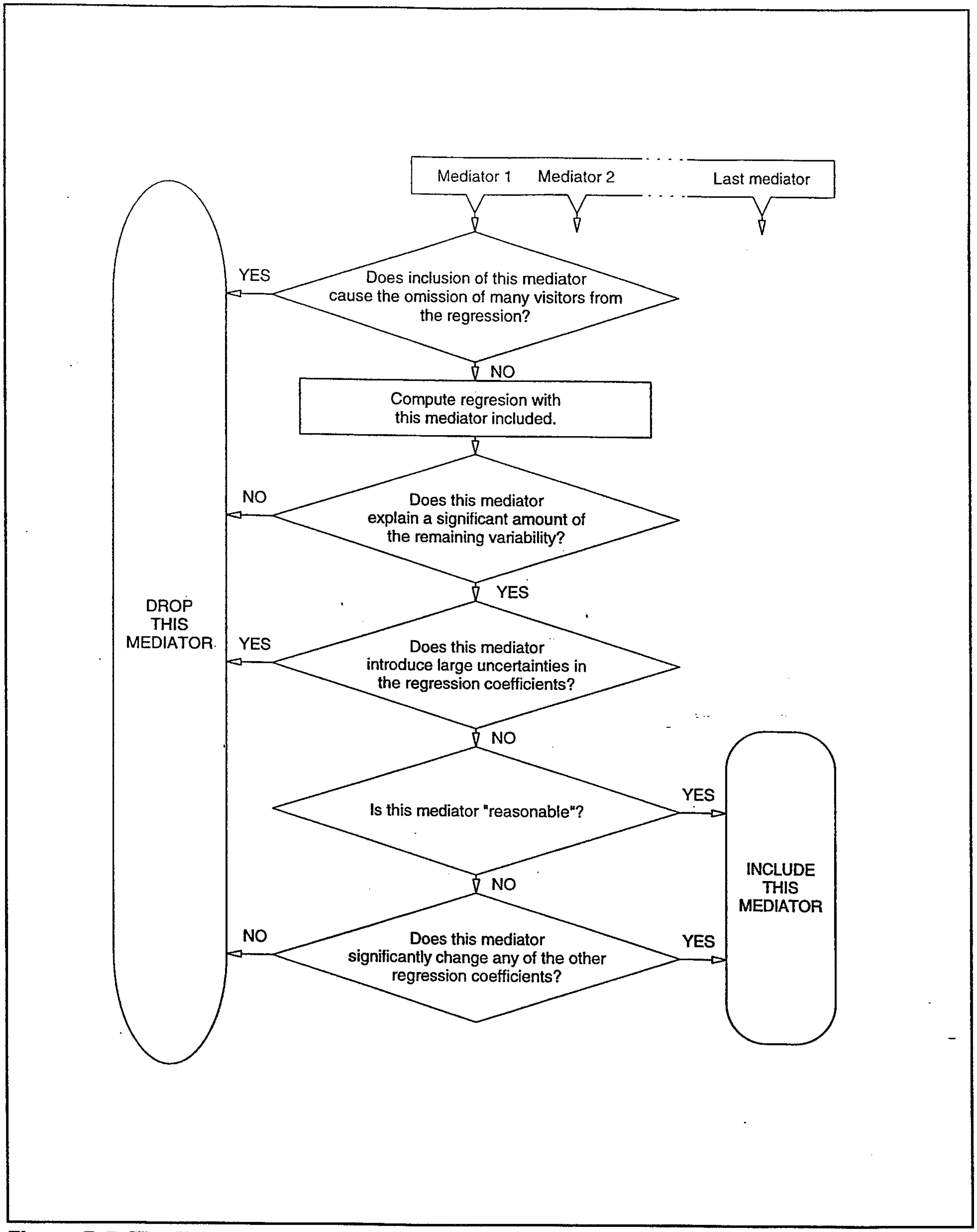

Figure B.5 The Tests for Inclusion of Each Mediator and Interaction

If the tested mediator *did* explain a significant amount of the remaining variability, then it was tested further, as described next. Inclusion of the tested mediator sometimes caused large uncertainties in the regression coefficients of previously included mediators or of the dose, itself. When this occurred, normally the regression coefficient of the tested mediator was highly uncertain, as well. When serious uncertainties in regression coefficients were caused by the inclusion of the tested mediator, then it was dropped from further consideration. Uncertainties of this type often resulted when the tested mediator was highly correlated with the dose or with a mediator previously included. Whenever two variables are highly correlated, including them both in a logistic regression always results in large uncertainties for their individual regression coefficients.[8]

Mediators that met these requirements were then assessed for "reasonableness." Those judged unreasonable for inclusion were excluded from further consideration, but only if their exclusion *did not* significantly change the regression coefficients of the remaining mediators, or of the dose itself.

Step 4: For each dose-response relationship, test for the importance of interactions among the retained mediators, and retain the influential interactions. Logistic regression determines the magnitude of the "trade-off" between dose and each retained mediator. For example, in Figure B.2, above, logistic regression resulted in two identically shaped dose-response curves that are shifted horizontally from one another by this dose tradeoff. Sometimes, however, a dose and a mediator are related in a more complex way than a simple shift in the dose-response curve. Instead of the mediator causing a horizontal shift in the dose-response curve, it might also change the steepness of the curve, for example. This more complex relationship between dose and mediator is called an "interaction" between the two.[9]

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8 In technical terms, such confounding was judged unacceptable when the regression coefficient of any included variable had a value that differed from zero with less than a 0.85 probability. In some cases, confounding was so extreme that Statistica could not compute standard errors of the regression coefficients. All such cases were also judged unacceptable.

9 For example, visitors who remember information about aircraft flights might be more sensitive to *increases* in aircraft sound than might no-information visitors. In this sense, "more sensitive" means that small increases in aircraft sound level might seem worse to them than the same small increases might to no-information visitors. If this is true, then the "info" dose-response curve would have to be steeper than the "no-info" curve. Dose and information would therefore "interact"—that is, the two curves in the figure, plotted against dose, would not be simple horizontal shifts of one another.

To test for interactions, logistic regressions were computed for all possible dose-mediator and mediator-mediator pairs of the variables that had been accepted for inclusion in Step 3.[10] These additional logistic regressions included special terms in them to test the importance of each of these possible interactions.

For the first dose-response regression (annoyance vs. percent time audible), none of the possible interactions were found to be important, and so none were retained in the first dose-response relationship. For this reason, interactions were not tested for the remaining three relationships. All these interactions appear in the tables of Appendix E.

At the end of this step, dose-response relationships are complete for each of the four dose-response pairs. These resulting dose-response relationships are graphed and described in Section B.4. An additional step is needed to complete the analysis for each dose-response relationship: compute regions of certainty. This step is described next.

Step 5: For each dose-response relationship, compute regions of certainty. As mentioned above, certainty is never absolute in any study that starts with sampled data. The more samples in the study, the greater will be the certainty in its resulting dose-response curves. In addition, certainty will be greater for some dose-response pairs than for others: it will be greater when the chosen dose strongly influences the chosen response. Also, for any particular dose-response curve, certainty will be greater in regions where most of the study's data lie—generally towards the center of the dose-response curve.

Interactions can also occur between different mediators, whenever one mediator significantly changes the influence of the other upon response. For example, say that visitor response differs between "info" and "no-info" visitors. Such a difference might possibly depend upon the mediator "first visit"—that is, upon whether visitors are there for the first time or not. If this dependence is true, then a test for "interaction" between these two mediators ("information" and "first time") would discover this interdependence and would include it quantitatively in the regression.

10 In technical terms, as each interaction was added to the analysis, its G-statistic was computed relative to the previous "nested" model. This G-statistic was then compared to the Chi-squared distribution for the number of "degrees of freedom" eliminated by the interaction under test. A 1-percent level of significance was used to judge inclusion for interactions, which is more stringent than for inclusion of mediators, themselves. In addition, the interaction was eliminated from consideration if it "confounded" with other terms in the regression or if it was not "reasonable" to include.

Regions of certainty were computed for each of the four dose-response curves, taking these considerations into account. In brief, the regions of certainty were computed with so-called "jackknife" techniques combined with propagation-of-error equations from the basic statistics literature. Technically, jackknifing inflates the size of the regions of confidence to compensate for the sampling method used in the study (sampling study days and then sampling visitors).

Appendix E contains the full transcript of each regression process, with specific conclusions about each mediator tested during this step, plus the following step, in the analysis. The computed regions of certainty appear in Appendix D.

B.4 Results: The Dose-Response Relationships

This section contains the results of the study: four dose-response relationships that allow prediction of visitor response from aircraft-sound dose and influential mediating variables. In addition, this section describes the use of these dose-response relationships and cautions the user about their applicability.

Figures B.6 through B.9 contain the four dose-response relationships developed in this study. Each figure contains a graph with a dose-response curve. For any value of dose, this dose-response curve predicts the percentage of visitors with that graph's response.

These four dose-response curves are drawn for average values of the mediating variables that proved clearly significant in the regression (see table in Chapter 7, above), except for the "information" variable. The curves assume that visitors remember no information about aircraft flights in the area. To evaluate response for non-average values of the mediating variables, the equations in Figure B.10 must be used, instead.

Finally, Tables B.3 through B.6 summarize the clearly significant factors for each of the four dose-response relationships.

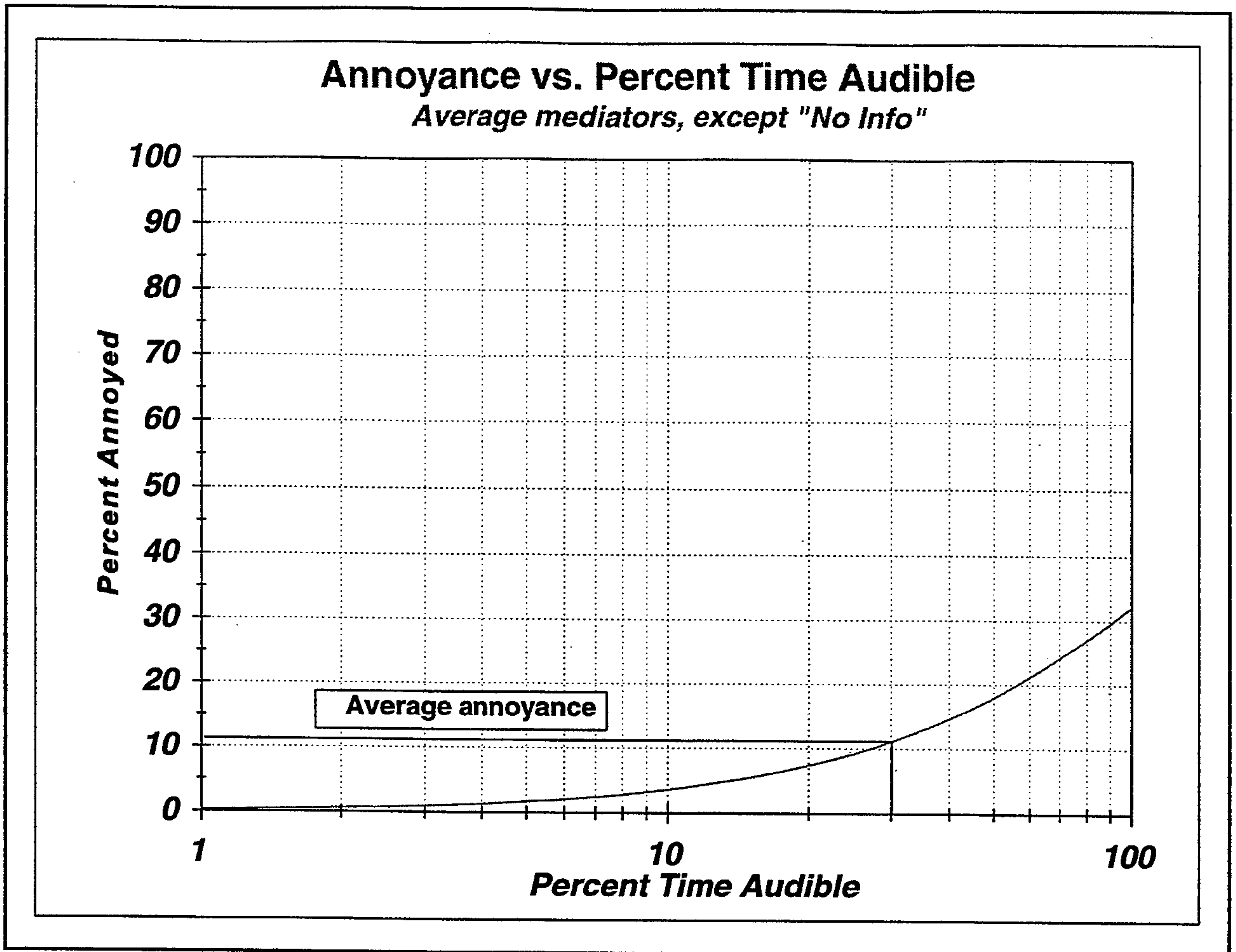

Figure B.6 Dose-Response Relationship: Annoyance Due to Aircraft Sound vs. Percentage of Time that Aircraft Are Audible

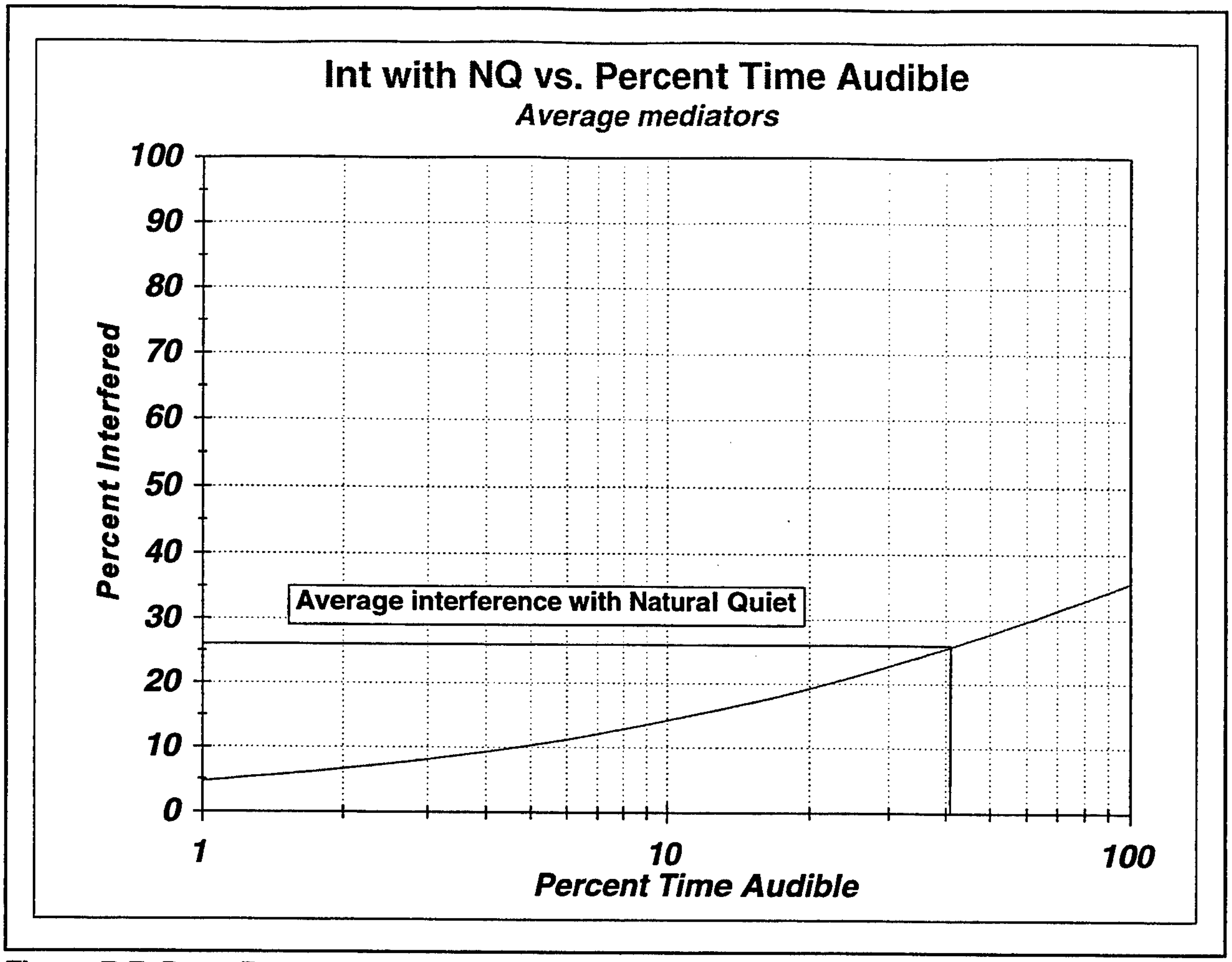

Figure B.7 Dose-Response Relationship: Interference with Natural Quiet vs. Percentage of Time that Aircraft Are Audible

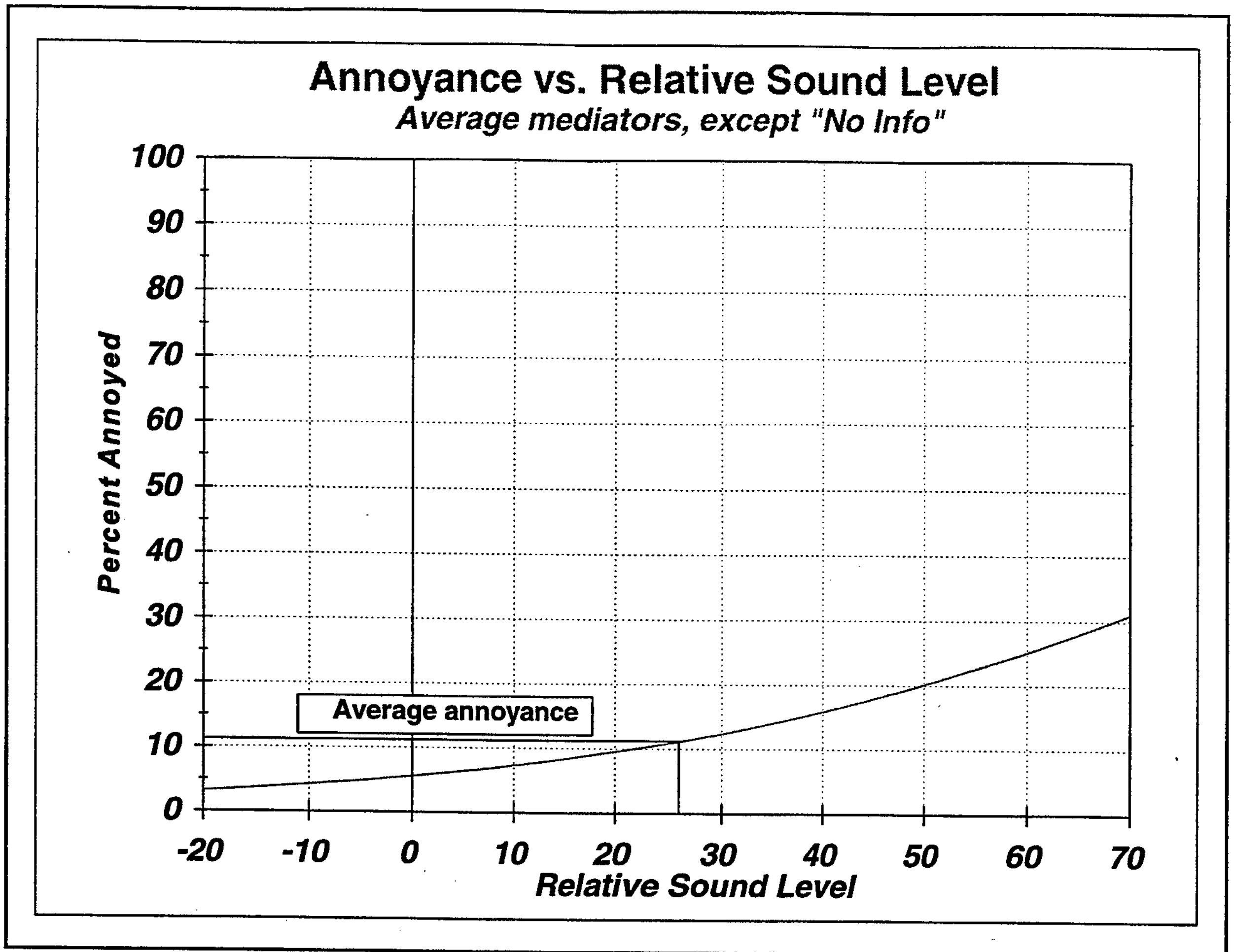

Figure B.8 Dose-Response Relationship: Annoyance Due to Aircraft Sound vs. Relative Sound Level (Aircraft L_{eq} minus Background L_{eq})

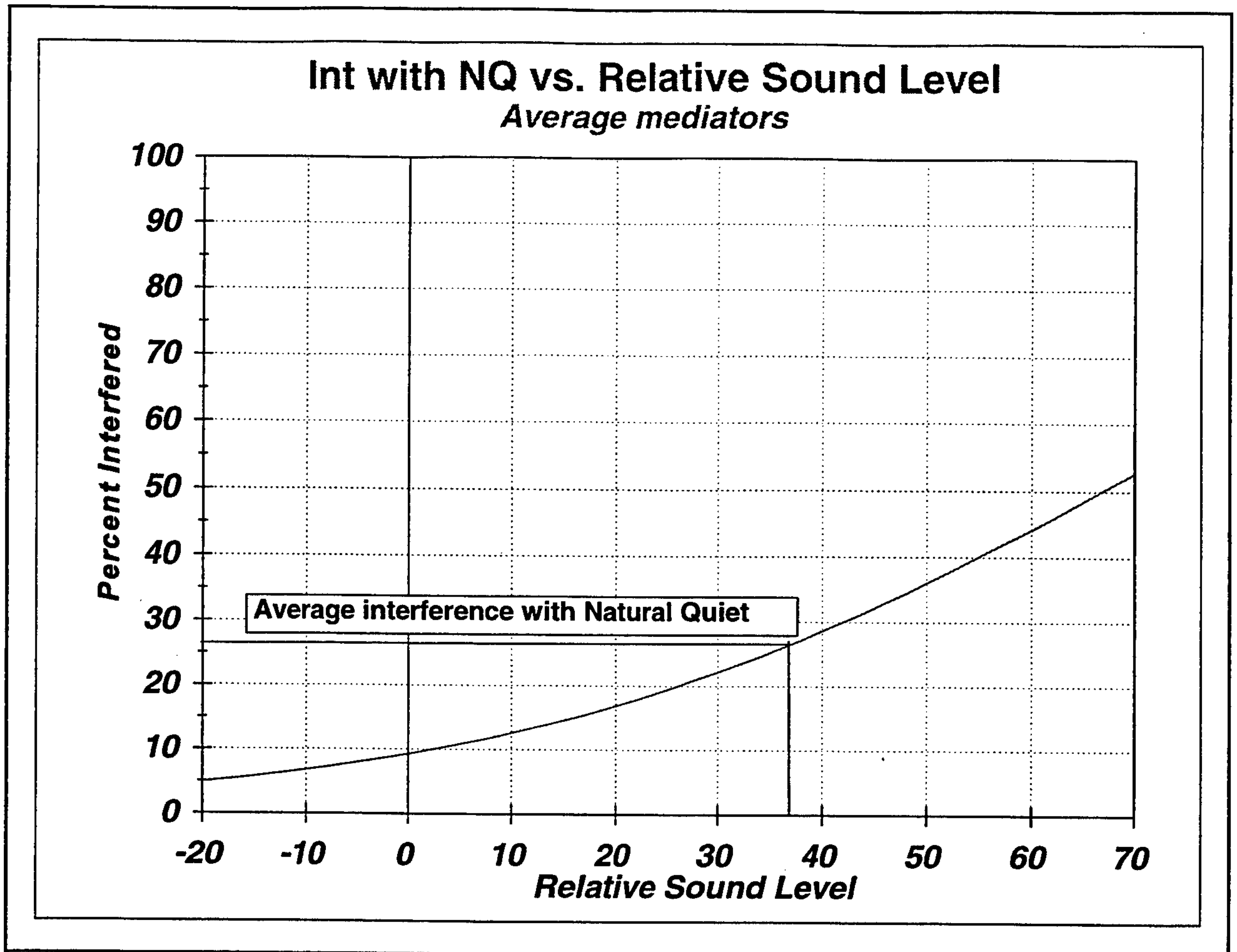

Figure B.9 Dose-Response Relationship: Interference with Natural Quiet vs. Relative Sound Level (Aircraft L_{eq} minus Background L_{eq})

Annoyance vs. Percent Time Aircraft Audible

$$P_{\substack{\textit{Visitors Annoyed}\\ \textit{(moderately or more)}}} = \frac{100\%}{1+e^{-X}}$$

where

$$\begin{aligned} X = {} & -5.98 + 2.55\log_{10}\left(P_{\textit{Time AC Audible}}\right) \\ & -0.0109\ P_{\textit{Who Remember AC Information}} \\ & +0.0123\ P_{\textit{Natural Quiet Very Important}} \\ & -0.0073\ P_{\textit{Groups with Children}} \\ & -0.0079\ P_{\textit{Women}}\ . \end{aligned}$$

Annoyance vs. Relative Sound Level (Aircraft L_{eq} minus Background L_{eq})

$$P_{\substack{\textit{Visitors Annoyed}\\ \textit{(moderately or more)}}} = \frac{100\%}{1+e^{-X}}$$

where

$$\begin{aligned} X = {} & -3.01 + 0.029\left(L_{eq,AC} - L_{eq,BK}\right) \\ & -0.0112\ P_{\textit{Who Remember AC Information}} \\ & +0.0121\ P_{\textit{Natural Quiet Very Important}} \\ & -0.0060\ P_{\textit{Groups with Children}} \\ & -0.0081\ P_{\textit{Women}}\ . \end{aligned}$$

Note: P equals percentage.

Figure B.10 Dose-Response Equations, to Allow Computation of Response for Any Value of the Significant Mediating Variables

Interference with Natural Quiet vs. Percent Time Aircraft Audible

$$P_{\substack{\text{Visitors for whom} \\ \text{aircraft interfered} \\ \text{with Natural Quiet} \\ \text{(moderately or more)}}} = \frac{100\%}{1+e^{-X}}$$

where

$$\begin{aligned} X = & -1.86 + 1.20\log_{10}\left(P_{Time\ AC\ Audible}\right) \\ & +0.0065\ P_{Natural\ Quiet\ Very\ Important} \\ & -0.0091\ P_{Groups\ with\ Children} \\ & -0.0067\ P_{Women} \\ & -0.0212\ A_{(Average\ visitor\ age)}\ . \end{aligned}$$

Interference with Natural Quiet vs. Relative Sound Level (Aircraft L_{eq} minus Background L_{eq})

$$P_{\substack{\text{Visitors for whom} \\ \text{aircraft interfered} \\ \text{with Natural Quiet} \\ \text{(moderately or more)}}} = \frac{100\%}{1+e^{-X}}$$

where

$$\begin{aligned} X = & -1.05 + 0.034\left(L_{eq,AC} - L_{eq,BK}\right) \\ & +0.0055\ P_{Natural\ Quiet\ Very\ Important} \\ & -0.0085\ P_{Groups\ with\ Children} \\ & -0.0073\ P_{Women} \\ & -0.022\ A_{(Average\ visitor\ age)}\ . \end{aligned}$$

Note: P equals percentage.

Figure B.10 (continued) Dose-Response Equations, to Allow Computation of Response for Any Value of the Significant Mediating Variables

Table B.3. Clearly significant factors:
Annoyance vs. Percent Time Aircraft Audible

Factor	Description	Effect on annoyance	Equivalent dose	Certainty[1]
The dose for this dose-response relationship				
Percent time aircraft audible	Higher doses increase visitor annoyance (see dose-response curve).	Dividing "percent time aircraft audible" by 2 reduces average annoyance from 11% to 6%.	----------	100%
Other significant factors for this dose-response relationship				
Information				
Information about aircraft flights in the area	Visitors who remember information about aircraft flights are **less** annoyed.	"Information" reduces average annoyance from 11% to 4%.	"Information" is equivalent to dividing "percent time aircraft audible" by 3.	99%
Visitor factors				
Importance of Natural Quiet	If visitors consider Natural Quiet very important, they are **more** annoyed.	"Natural Quiet very important" increases average annoyance from 11% to 29%.	"Natural Quiet very important" is equivalent to multiplying "percent time aircraft audible" by 3.	99%
Children in group	Adults with children in group are **less** annoyed.	"Children" reduces average annoyance from 11% to 5%.	"Children" is equivalent to dividing "percent time aircraft audible" by 2.	96%
Gender	Women are **less** annoyed.	"Women" reduces average annoyance from 11% to 5%.	"Women" is equivalent to dividing "percent time aircraft audible" by 2 (compared to men).	97%

1 Criterion equals 90 percent.

Table B.4. Clearly significant factors:
Annoyance vs. Relative Sound Level (Aircraft L_{eq} minus Background L_{eq})

Factor	Description	Effect on annoyance	Equivalent dose	Certainty[1]
The dose for this dose-response relationship				
Relative sound level: AC L_{eq} minus BK L_{eq}	Higher doses increase visitor annoyance (see dose-response curve).	Reducing "relative sound level" by 10 dB reduces average annoyance from 11% to 9%.	----------	100%
Other significant factors for this dose-response relationship				
Information				
Information about aircraft flights in the area	Visitors who remember information about aircraft flights are **less** annoyed.	"Information" reduces average annoyance from 11% to 4%.	"Information" is equivalent to reducing "relative sound level" by 40 dB.	100%
Visitor factors				
Importance of Natural Quiet	If visitors consider Natural Quiet very important, they are **more** annoyed.	"Natural Quiet very important" increases average annoyance from 11% to 29%.	"Natural Quiet very important" is equivalent to increasing "relative sound level" by 40 dB.	99%
Children in group	Adults with children in group are **less** annoyed.	"Children" reduces average annoyance from 11% to 6%.	"Children" is equivalent to reducing "relative sound level" by 20 dB.	91%
Gender	Women are **less** annoyed.	"Women" reduces average annoyance from 11% to 5%.	"Women" is equivalent to reducing "relative sound level" by 30 dB (compared to men).	96%

[1] Criterion equals 90 percent.

Table B.5. Clearly significant factors: Interference with Natural Quiet vs. Percent Time Aircraft Audible

Factor	Description	Effect on NQ interference	Equivalent dose	Certainty[1]
The dose for this dose-response relationship				
Percent time aircraft audible	Higher doses interfere more with visitor appreciation of Natural Quiet (see dose-response curve).	Dividing "percent time aircraft audible" by 2 reduces average NQ interference from 26% to 19%.	--------------	99%
Other significant factors for this dose-response relationship				
Visitor factors				
Importance of Natural Quiet	If visitors consider Natural Quiet very important, they perceive **more** interference with Natural Quiet.	"Natural Quiet very important" increases average NQ interference from 26% to 40%.	"Natural Quiet very important" is equivalent to multiplying "percent time aircraft audible" by 3.	96%
Children in group	Adults with children in group perceive **less** interference with Natural Quiet.	"Children" reduces average NQ interference from 26% to 12%.	"Children" is equivalent to dividing "percent time aircraft audible" by 6.	100%
Gender	Women perceive **less** interference with Natural Quiet.	"Women" reduces average NQ interference from 26% to 15%.	"Women" is equivalent to dividing "percent time aircraft audible" by 4 (compared to men).	100%
Age	Older visitors perceive **less** interference with Natural Quiet.	"20 years older" reduces average NQ interference from 26% to 19%.	"20 years older" is equivalent to dividing "percent time aircraft audible" by 2.	100%

1 Criterion equals 90 percent.

Table B.6. Clearly important factors:
Interference with Natural Quiet vs. Relative Sound Level (Aircraft L_{eq} minus Background L_{eq})

Factor	Description	Effect on NQ interference	Equivalent dose	Certainty[1]
The dose for this dose-response relationship				
Relative sound level: AC L_{eq} minus BK L_{eq}	Higher doses interfere more with visitor appreciation of Natural Quiet (see dose-response curve).	Reducing "relative sound level" by 10 dB reduces average NQ interference from 26% to 20%.	---------------	100%
Other significant factors for this dose-response relationship				
Visitor factors				
Importance of Natural Quiet	If visitors consider Natural Quiet very important, they perceive **more** interference with Natural Quiet.	"Natural Quiet very important" increases average NQ interference from 26% to 38%.	"Natural Quiet very important" is equivalent to increasing "relative sound level" by 15 dB.	90%
Children in group	Adults with children in group perceive **less** interference with Natural Quiet.	"Children" decreases average NQ interference from 26% to 13%.	"Children" is equivalent to reducing "relative sound level" by 25 dB.	100%
Gender	Women perceive **less** interference with Natural Quiet.	"Women" decreases average NQ interference from 26% to 15%.	"Women" is equivalent to reducing "relative sound level" by 20 dB (compared to men).	100%
Age	Older visitors perceive **less** interference with Natural Quiet.	"20 years older" decreases average NQ interference from 26% to 18%.	"20 years older" is equivalent to reducing "relative sound level" by 15 dB.	100%

[1] Criterion equals 90 percent.

B.4.1 Prediction of Visitor Response from Dose and Mediator Conditions

This section describes, by example, how these dose-response relationships are used to predict visitor response from visitor dose and mediator conditions. The first example answers the following question:

> What percentage of visitors will be annoyed with the sound of aircraft, under the following conditions?
>
> - Dose: Aircraft are audible 80 percent of the time
> - Information: 10 percent of visitors remember some information about aircraft flights, even though no information is presented to them at the site
> - Natural quiet very important: 50 percent of visitors
> - Children in group: 50 percent of visitor groups
> - Gender: 50 percent women

Because this question concerns visitor annoyance and percentage of time aircraft can be heard, a first approximation can be obtained from Figure B.6. From the graph, when aircraft are audible 80 percent of the time, then approximately 27 percent of visitors will be annoyed, moderately or more, for average mediator conditions.[11] However, this is actually the *wrong* predicted response, because the actual values of the mediators have not been taken into account.

To determine response for non-average values of the mediator variables, the full dose-response equations must be used. These equations appear in Figure B.10, above.

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[11] In detail, locate the dose, 80, on the horizontal axis of the graph. Draw a line vertically upwards to the dose-response curve. Then draw a horizontal line from there to the left, until it intersects the vertical axis. The resulting percentage of visitors, read on the vertical axis, equals 27 percent.

The first of these equations is the applicable one. Computation involves the following steps:

- Compute the value of X by substituting the following values into its equation:
  $P_{Time\ AC\ Audible} = 80$,
  $P_{Who\ Remember\ AC\ Information} = 10$,
  $P_{Natural\ Quiet\ Very\ Important} = 50$,
  $P_{Groups\ with\ Children} = 50$, and
  $P_{Women} = 50$.
  This results in $X = -1.38$.

- Compute the response $P_{Visitors\ Annoyed\ (moderately\ or\ more)}$, by substituting this value of X into the P part of the equation. During substitution make sure to account for the minus sign in the denominator of P, which will change -1.38 to +1.38.
  This results in $P_{Visitors\ Annoyed\ (moderately\ or\ more)} = 20$ percent.

Note that this differs from the graph's value of 27 percent, for average mediator values.

B.4.2 Prediction of Reduction in Response Due to Reduction in Dose

Reductions in dose will produce corresponding reductions in response, when all else remains constant. Such reductions in response are potential benefits of various types and amounts of possible reduction in aircraft-sound dose. To predict reductions in response, dose-response equations must be used twice, first with the original dose and then with the reduced dose. By subtracting the two responses that result, the user can predict reduction in response.

To continue the example from the previous section, before reduction:

- Compute the value of X by substituting the following values into its equation:
  $P_{Time\ AC\ Audible} = 80$,
  $P_{Who\ Remember\ AC\ Information} = 10$,
  $P_{Natural\ Quiet\ Very\ Important} = 50$,
  $P_{Groups\ with\ Children} = 50$, and
  $P_{Women} = 50$.
  This results in $X = -1.38$, as in the previous section.

- Compute the response $P_{\text{Visitors Annoyed (moderately or more)}}$, by substituting this value of X into the P part of the equation.

  This results in $P_{\text{Visitors Annoyed (moderately or more)}} = 20$ percent, as in the previous section.

Then reduce the dose from 80 to 50 percent time audible:

- Compute the value of X by substituting the following values into its equation:

  $P_{\text{Time AC Audible}} = 50$,

  $P_{\text{Who Remember AC Information}} = 10$,

  $P_{\text{Natural Quiet Very Important}} = 50$,

  $P_{\text{Groups with Children}} = 50$, and

  $P_{\text{Women}} = 50$.

  This results in $X = -1.90$, which differs because $P_{\text{Time AC Audible}}$ has changed.

- Compute the response $P_{\text{Visitors Annoyed (moderately or more)}}$, by substituting this value of X into the P part of the equation.

  This results in $P_{\text{Visitors Annoyed (moderately or more)}} = 13$ percent.

By this change in dose, annoyance is reduced from 20 percent of visitors to 13 percent of visitors. A total of 7 percent of the visitors benefit from this dose reduction.

Note that the graph, alone, can provide a very decent approximation of this 7 percent "change," even though the graph is for average mediators. From the graph, a dose of 80 yields a response of 27 percent annoyance. Then a dose of 50 yields a response of 18 percent annoyance. Then 27 minus 18 yields a benefit to 9 percent of the visitors—a relatively good approximation to 7 percent from the more-applicable equations. The graphs are reasonably accurate for changes because the mediator effects tend to subtract out when only the dose changes—though not exactly, as is apparent from this example (7 verses 9).

B.4.3 Prediction of Change in Response Due to Change in a Mediator's Value

Changes in mediators will also produce changes in response, when all else remains constant. For example, if visitors are informed about the presence of aircraft in the area, so that the great majority of them remember the aircraft information, then fewer visitors will be annoyed by aircraft sounds. The dose-response equations allow such a benefit to be computed. Just as in the preceding section, dose-response equations must be used twice, first with the original mediator value and then with the changed value. By subtracting the two responses that result, the user can predict reduction in response.

With the original mediator value:

- Compute the value of X by substituting the following values into its equation:
  $P_{Time\ AC\ Audible} = 80$,
  $P_{Who\ Remember\ AC\ Information} = 10$,
  $P_{Natural\ Quiet\ Very\ Important} = 50$,
  $P_{Groups\ with\ Children} = 50$, and
  $P_{Women} = 50$.
  This results in $X = -1.38$, as in the previous section.

- Compute the response $P_{Visitors\ Annoyed\ (moderately\ or\ more)}$, by substituting this value of X into the P part of the equation.
  This results in $P_{Visitors\ Annoyed\ (moderately\ or\ more)} = 20$ percent, as in the previous section.

Then change $P_{Who\ Remember\ AC\ Information}$ from 20 to 90 percent:

- Compute the value of X by substituting the following values into its equation:
  $P_{Time\ AC\ Audible} = 80$,
  $P_{Who\ Remember\ AC\ Information} = 90$,
  $P_{Natural\ Quiet\ Very\ Important} = 50$,
  $P_{Groups\ with\ Children} = 50$, and
  $P_{Women} = 50$.
  This results in $X = -2.25$, which differs because $P_{Who\ Remember\ AC\ Information}$ has changed.

- Compute the response $P_{Visitors\ Annoyed\ (moderately\ or\ more)}$, by substituting this value of X into the P part of the equation.
  This results in $P_{Visitors\ Annoyed\ (moderately\ or\ more)} = 10$ percent.

The information campaign has reduced expected annoyance from 27 percent of visitors to 10 percent of visitors—a substantial reduction. Note that the graph cannot be used to estimate the effect of this change in mediator values.

B.4.4 Cautions about Applicability

This section contains several cautions about the applicability of these dose-response relationships to a particular user study area. The first caution concerns the distinction between specific sites and entire parks. The study's data were collected on visitor reactions and sound levels at a specific site, and therefore should be applied to specific sites only and not extended to an entire park. Many sites within a park may be individually considered, but there is no simple way to extend the results to an entire park visit. This caution is not considered to be a serious limitation on usefulness. Impacts are not likely to occur for an entire park, but for specific areas. Also, and importantly, pragmatic solutions will likely be examined on a site-by-site basis, rather than for an entire park. That is, assuming overflights will occur, the most likely solutions will probably involve routing the flights to minimize impacts in the most sensitive areas.

The second caution concerns visit duration. All measurement sites were located where visitors were there for brief-to-moderate periods (15 minutes to one-to-two hours) and were outdoors the entire time. Hence, the results are untested for locations where visitors are stay for a full day, are indoors part of the time, or stay overnight.

Additional cautions are necessary because the study's results are derived from one site in a specific park, that experienced primarily low altitude military jet overflights. Because rigorous statistical generalization is not possible, users will have to judge whether or not to accept the study's results for their particular study areas. Of primary consideration, a user's study area should be similar to the study area of this study. See Chapter 7 of the main report for details about the study area. Chapter 7 also provides basic descriptive data about the types of sound levels and exposures experienced by visitors, plus basic demographics about the visitors. This information can help in comparisons with other National Park sites affected by military jet aircraft.

The remainder of this section contains additional guidelines that may help the user judge the applicability of the study's results to other National Park locations. They are intended to provide general guidance to the user, even though this guidance cannot be derived from the data analysis alone. They are based upon the collected experience of the authors.

- **Other parks.** All data were taken at a single site in White Sands National Monument. Though this is certainly a scenic natural park, it is located only a short drive from near-by Alamogordo, NM, and the site itself is easily accessed by road vehicle on a paved road. This ease of access may affect visitor expectations about how much solitude or quiet may be available. In other words, the results probably do not apply to military jet overflights of remote wilderness or backcountry park areas.

- **Other seasons.** All data were collected during weather that was warm to hot, with no precipitation, during the summer. Application of the results to other conditions is untested.

- **Other types of activities.** All visitors were walking or hiking. Sites where visitors leave their cars and walk for a half hour to several hours in natural scenery may be considered as comparable in activity. Sites where visitors drive up, park, and then walk no more than a minute or two, and sites with other activities—such as boating, biking, or horse-back riding—probably are too different for application of this study's findings.

- **Other aircraft types / flight conditions.** Essentially only military jet aircraft at fairly low altitudes were present during data collection. The results probably should be applied only to sites that experience similar jet activity. It is likely the results would not apply to high altitude jet activity, for example.

- **Other types of background sound.** For all measurements, background sound levels were produced by such sources as wind, limited parking-lot activities, visitor talking, and low speed road traffic. The results can probably be applied where similar types of fairly continuous or slowly changing sounds exist, such as those produced by distant motor vehicle traffic, droning insects or wild life (e.g. birds, frogs).

- **Other conditions for those mediators that proved not important.** Only a limited number of mediators had enough influence on responses to be included in the study's results, as listed in Tables B.3 through B.6. We believe that the study's results can be used without regard to the remaining mediators, except for aircraft grouping, which had some influence, and may be used pragmatically in aircraft scheduling, see Chapter 7 of the main report and Appendix F.

APPENDIX C - MEASURED CORRELATION COEFFICIENTS

Appendix C. MEASURED CORRELATION COEFFICIENTS

This appendix contains, in Figures C.1 through C.6, the following sets of correlation coefficients for variables used in the study:

- Dose vs. dose,
- Dose vs. response,
- Dose vs. mediator,
- Response vs. response,
- Response vs. mediator, and
- Mediator vs. mediator.

The full study included 351 visitors. However, when the Statistica computer program calculated the correlation coefficients in these tables, it used the specific number of visitors, N, shown at the top of each table—always less than 351 and somewhat different for each of the tables. For omitted visitors, one or more of the table parameters were not measured in the study. For example, the first table (dose vs. dose correlations) incorporates N=325 visitors; it omits 26 visitors. For these 26 visitors, one or more doses are missing in the database, because they were not measured.

Note that several correlation coefficients appear in multiple tables. Because each table omits a slightly different set of visitors, sometimes such coefficients may differ slightly from table to table. For example, the DACNUM/DACTIM coefficient is equal to 0.510 in Figure C.1 (N=325) but equal to 0.555 in Figure C.3 (N=251), where many additional visitors are omitted for lack of a mediator value.

Shown in Table C.1 are the variable abbreviations used in the correlation coefficient matrices. The correlation coefficients provide further documentation of the study's data.

Table C.1. List of Primary Variables: Doses, Responses and Mediators

VARIABLE	CODE
PRIMARY DOSES	
Non-acoustical doses	
Percent time aircraft audible	DACTIM
Number of audible aircraft events	DACNUM
Aircraft sound, alone	
Aircraft L_{max} (maximum A-weighted sound level)	DSLMAX
Aircraft L_{eq} (equivalent sound level)	DSLLEQ
Aircraft SEL (Sound Exposure Level)	DSLSEL
Relative sound level (aircraft sound minus background sound)	
Aircraft L_{eq} minus background L_{eq}	DREBQQ
RESPONSES CHOSEN	
Annoyance due to aircraft sound	RANNOY$
Interference with appreciation of Natural Quiet and sounds of nature	RINTNQ$
MEDIATORS	
Information	
Trailhead sign: "Military aircraft can regularly be seen and heard on this walk."	
Information about aircraft flights in the area (visitor remembers seeing the trailhead sign, or seeing/hearing other information about military aircraft in the area)	INFO
Trailhead sign posted, whether or not the visitor remembers it	SIGN
Aircraft grouping	
Grouping together of aircraft flights (first method)	DACNUM +DACTIM
Grouping together of aircraft flights (second method)	DSLLEQ +DACTIM
Other aircraft factors	
Overhead flights, or not	OVERHD
Closest-aircraft distance (any effect beyond dose, alone?)	MDISCLS
Closest-aircraft SEL (any effect beyond dose, alone?)	MSELCLS
Aircraft L_{max} (any effect beyond dose, alone?)	DSLMAX
Aircraft L_{eq} (any effect beyond percent time aircraft audible, alone?)	DSLLEQ
Visitor-related: Importance of reasons for visiting	
Importance of Natural Quiet and sounds of nature	MIMPNQ$
Visitor-related: Other	
Gender	MVISSX
Age	MVISAG
Children in group, or not	MNUMCH
Time of visit (am or pm)	HVISTM
Number of adults in group	MNUMAD
First visit to site, or not	MFRST
Other	
Background L_{eq}	MBACKQ
Specific date of visit	HVISDT$
Specific interviewer	HINTVR$

Italics show those variables that were retained in the final dose-response relationships.

STAT. BASIC STATS	Correlations, Casewise MD deletion, N=325 (whtsnd10.sta)				
Variable	DACTIM	DACNUM	DSLMAX	DSLLEQ	DREBQQ
DACTIM	1.000	.510	.448	.536	.625
DACNUM	.510	1.000	.080	.110	.196
DSLMAX	.448	.080	1.000	.986	.924
DSLLEQ	.536	.110	.986	1.000	.958
DREBQQ	.625	.196	.924	.958	1.000

Figure C.1. Correlation Coefficients: Dose vs. Dose

STAT. BASIC STATS	Correlations, Casewise MD deletion, N=325 (whtsnd10.sta)						
Variable	DACTIM	DACNUM	DSLMAX	DSLLEQ	DREBQQ	RANNOY$	RINTNQ$
DACTIM	1.000	.510	.448	.536	.625	.141	.177
DACNUM	.510	1.000	.080	.110	.196	.046	.027
DSLMAX	.448	.080	1.000	.986	.924	.172	.245
DSLLEQ	.536	.110	.986	1.000	.958	.173	.245
DREBQQ	.625	.196	.924	.958	1.000	.172	.254
RANNOY$	.141	.046	.172	.173	.172	1.000	.717
RINTNQ$	.177	.027	.245	.245	.254	.717	1.000

Figure C.2. Correlation Coefficients: Dose vs. Response

STAT. BASIC STATS	Correlations, Casewise MD deletion, N=251 (whtsnd10.sta)									
Variable	DACTIM	DACNUM	DSLMAX	DSLLEQ	DREBQQ	INFO	SIGN	OVERHD	MDISCLS	MSELCLS
DACTIM	1.000	.555	.192	.360	.509	.071	.037	--	-.223	.121
DACNUM	.555	1.000	.137	.176	.289	.145	-.024	--	-.178	.072
DSLMAX	.192	.137	1.000	.962	.807	.034	-.109	--	-.673	.853
DSLLEQ	.360	.176	.962	1.000	.881	.025	-.088	--	-.670	.827
DREBQQ	.509	.289	.807	.881	1.000	-.026	-.071	--	-.598	.662
INFO	.071	.145	.034	.025	-.026	1.000	.190	--	.032	.013
SIGN	.037	-.024	-.109	-.088	-.071	.190	1.000	--	-.046	-.102
OVERHD	--	--	--	--	--	--	--	1.000	--	--
MDISCLS	-.223	-.178	-.673	-.670	-.598	.032	-.046	--	1.000	-.535
MSELCLS	.121	.072	.853	.827	.662	.013	-.102	--	-.535	1.000
MIMPNQ$	.095	.163	.085	.074	.116	.065	-.014	--	.087	.050
MVISSX	.011	.013	-.047	-.035	-.007	.059	.037	--	.088	-.073
MVISAGC	-.050	-.066	.025	.000	.038	.011	.034	--	-.070	-.037
MNUMCH	.129	-.029	.066	.078	.040	.033	-.005	--	-.009	.092
HVISTM$	-.432	-.385	-.040	-.082	-.259	-.059	-.115	--	.169	.005
MNUMAD	-.037	-.107	-.089	-.081	-.213	.076	.071	--	.036	-.080
MFRST	-.146	-.080	.085	.073	.037	-.069	-.066	--	-.051	.072
MBACKQ	-.452	-.305	-.052	-.143	-.594	.097	-.000	--	.112	.021
HVISDT$	-.204	-.153	-.129	-.151	-.138	-.086	-.134	--	.192	-.117
HINTVR$	-.161	-.205	-.081	-.098	-.141	-.047	.096	--	.157	-.024

STAT. BASIC STATS	Correlations, Casewise MD deletion, N=251 (whtsnd10.sta)									
Variable	MIMPNQ$	MVISSX	MVISAGC	MNUMCH	HVISTM$	MNUMAD	MFRST	MBACKQ	HVISDT$	HINTVR$
DACTIM	.095	.011	-.050	.129	-.432	-.037	-.146	-.452	-.204	-.161
DACNUM	.163	.013	-.066	-.029	-.385	-.107	-.080	-.305	-.153	-.205
DSLMAX	.085	-.047	.025	.066	-.040	-.089	.085	-.052	-.129	-.081
DSLLEQ	.074	-.035	.000	.078	-.082	-.081	.073	-.143	-.151	-.098
DREBQQ	.116	-.007	.038	.040	-.259	-.213	.037	-.594	-.138	-.141
INFO	.065	.059	.011	.033	-.059	.076	-.069	.097	-.086	-.047
SIGN	-.014	.037	.034	-.005	-.115	.071	-.066	-.000	-.134	.096
OVERHD	--	--	--	--	--	--	--	--	--	--
MDISCLS	.087	.088	-.070	-.009	.169	.036	-.051	.112	.192	.157
MSELCLS	.050	-.073	-.037	.092	.005	-.080	.072	.021	-.117	-.024
MIMPNQ$	1.000	.099	.074	-.050	-.133	-.139	.004	-.118	.041	-.020
MVISSX	.099	1.000	.051	-.005	-.089	-.047	.028	-.044	.056	-.065
MVISAGC	.074	.051	1.000	.091	-.130	-.129	-.117	-.080	.023	-.251
MNUMCH	-.050	-.005	.091	1.000	.064	.066	-.123	.050	-.027	.101
HVISTM$	-.133	-.089	-.130	.064	1.000	.016	.093	.403	.070	.124
MNUMAD	-.139	-.047	-.129	.066	.016	1.000	.019	.307	.040	.132
MFRST	.004	.028	-.117	-.123	.093	.019	1.000	.047	.029	.037
MBACKQ	-.118	-.044	-.080	.050	.403	.307	.047	1.000	.032	.128
HVISDT$	.041	.056	.023	-.027	.070	.040	.029	.032	1.000	.092
HINTVR$	-.020	-.065	-.251	.101	.124	.132	.037	.128	.092	1.000

Figure C.3. Correlation Coefficients: Dose vs. Mediator

STAT. BASIC STATS	Correlations, Casewise MD deletion, N=331 (whtsnd10.sta)	
Variable	RANNOY$	RINTNQ$
RANNOY$	1.000	.709
RINTNQ$	.709	1.000

Figure C.4. Correlation Coefficients: Reponse vs. Response

STAT. BASIC STATS	Correlations, Casewise MD deletion, N=251 (whtsnd10.sta)												
Variable	RANNOY$	RINTNQ$	INFO	SIGN	DACNUM	DACTIM	DSLLEQ	OVERHD	MDISCLS	MSELCLS	DSLMAX	MIMPNQ$	MVISSX
RANNOY$	1.000	.714	-.020	-.080	.029	.076	.070	--	-.081	.041	.077	.082	-.099
RINTNQ$	.714	1.000	.048	-.026	.027	.079	.096	--	-.053	.039	.108	.079	-.164
INFO	-.020	.048	1.000	.190	.145	.071	.025	--	.032	.013	.034	.065	.059
SIGN	-.080	-.026	.190	1.000	-.024	.037	-.088	--	-.046	-.102	-.109	-.014	.037
DACNUM	.029	.027	.145	-.024	1.000	.555	.176	--	-.178	.072	.137	.163	.013
DACTIM	.076	.079	.071	.037	.555	1.000	.360	--	-.223	.121	.192	.095	.011
DSLLEQ	.070	.096	.025	-.088	.176	.360	1.000	--	-.670	.827	.962	.074	-.035
OVERHD	--	--	--	--	--	--	--	1.000	--	--	--	--	--
MDISCLS	-.081	-.053	.032	-.046	-.178	-.223	-.670	--	1.000	-.535	-.673	.087	.088
MSELCLS	.041	.039	.013	-.102	.072	.121	.827	--	-.535	1.000	.853	.050	-.073
DSLMAX	.077	.108	.034	-.109	.137	.192	.962	--	-.673	.853	1.000	.085	-.047
MIMPNQ$	.082	.079	.065	-.014	.163	.095	.074	--	.087	.050	.085	1.000	.099
MVISSX	-.099	-.164	.059	.037	.013	.011	-.035	--	.088	-.073	-.047	.099	1.000
MVISAGC	-.174	-.102	.011	.034	-.066	-.050	.000	--	-.070	-.037	.025	.074	.051
MNUMCH	-.149	-.177	.033	-.005	-.029	.129	.078	--	-.009	.092	.066	-.050	-.005
HVISTM$	-.095	-.087	-.059	-.115	-.385	-.432	-.082	--	.169	.005	-.040	-.133	-.089
MNUMAD	.014	.007	.076	.071	-.107	-.037	-.081	--	.036	-.080	-.089	-.139	-.047
MFRST	.038	.026	-.069	-.066	-.080	-.146	.073	--	-.051	.072	.085	.004	.028
MBACKQ	-.030	-.082	.097	-.000	-.305	-.452	-.143	--	.112	.021	-.052	-.118	-.044
HVISDT$	-.011	-.006	-.086	-.134	-.153	-.204	-.151	--	.192	-.117	-.129	.041	.056
HINTVR$	-.052	-.001	-.047	.096	-.205	-.161	-.098	--	.157	-.024	-.081	-.020	-.065

STAT. BASIC STATS	Correlations, Casewise MD deletion, N=251 (whtsnd10.sta)							
Variable	MVISAGC	MNUMCH	HVISTM$	MNUMAD	MFRST	MBACKQ	HVISDT$	HINTVR$
RANNOY$	-.174	-.149	-.095	.014	.038	-.030	-.011	-.052
RINTNQ$	-.102	-.177	-.087	.007	.026	-.082	-.006	-.001
INFO	.011	.033	-.059	.076	-.069	.097	-.086	-.047
SIGN	.034	-.005	-.115	.071	-.066	-.000	-.134	.096
DACNUM	-.066	-.029	-.385	-.107	-.080	-.305	-.153	-.205
DACTIM	-.050	.129	-.432	-.037	-.146	-.452	-.204	-.161
DSLLEQ	.000	.078	-.082	-.081	.073	-.143	-.151	-.098
OVERHD	--	--	--	--	--	--	--	--
MDISCLS	-.070	-.009	.169	.036	-.051	.112	.192	.157
MSELCLS	-.037	.092	.005	-.080	.072	.021	-.117	-.024
DSLMAX	.025	.066	-.040	-.089	.085	-.052	-.129	-.081
MIMPNQ$	.074	-.050	-.133	-.139	.004	-.118	.041	-.020
MVISSX	.051	-.005	-.089	-.047	.028	-.044	.056	-.065
MVISAGC	1.000	.091	-.130	-.129	-.117	-.080	.023	-.251
MNUMCH	.091	1.000	.064	.066	-.123	.050	-.027	.101
HVISTM$	-.130	.064	1.000	.016	.093	.403	.070	.124
MNUMAD	-.129	.066	.016	1.000	.019	.307	.040	.132
MFRST	-.117	-.123	.093	.019	1.000	.047	.029	.037
MBACKQ	-.080	.050	.403	.307	.047	1.000	.032	.128
HVISDT$	.023	-.027	.070	.040	.029	.032	1.000	.092
HINTVR$	-.251	.101	.124	.132	.037	.128	.092	1.000

Figure C.5. Correlation Coefficients: Response vs. Mediator

STAT. BASIC STATS	Correlations, Casewise MD deletion, N=251 (whtsnd10.sta)									
Variable	INFO	SIGN	DACNUM	DACTIM	DSLLEQ	OVERHD	MDISCLS	MSELCLS	DSLMAX	MIMPNQ$
INFO	1.000	.190	.145	.071	.025	--	.032	.013	.034	.065
SIGN	.190	1.000	-.024	.037	-.088	--	-.046	-.102	-.109	-.014
DACNUM	.145	-.024	1.000	.555	.176	--	-.178	.072	.137	.163
DACTIM	.071	.037	.555	1.000	.360	--	-.223	.121	.192	.095
DSLLEQ	.025	-.088	.176	.360	1.000	--	-.670	.827	.962	.074
OVERHD	--	--	--	--	--	1.000	--	--	--	--
MDISCLS	.032	-.046	-.178	-.223	-.670	--	1.000	-.535	-.673	.087
MSELCLS	.013	-.102	.072	.121	.827	--	-.535	1.000	.853	.050
DSLMAX	.034	-.109	.137	.192	.962	--	-.673	.853	1.000	.085
MIMPNQ$	.065	-.014	.163	.095	.074	--	.087	.050	.085	1.000
MVISSX	.059	.037	.013	.011	-.035	--	.088	-.073	-.047	.099
MVISAGC	.011	.034	-.066	-.050	.000	--	-.070	-.037	.025	.074
MNUMCH	.033	-.005	-.029	.129	.078	--	-.009	.092	.066	-.050
HVISTM$	-.059	-.115	-.385	-.432	-.082	--	.169	.005	-.040	-.133
MNUMAD	.076	.071	-.107	-.037	-.081	--	.036	-.080	-.089	-.139
MFRST	-.069	-.066	-.080	-.146	.073	--	-.051	.072	.085	.004
MBACKQ	.097	-.000	-.305	-.452	-.143	--	.112	.021	-.052	-.118
HVISDT$	-.086	-.134	-.153	-.204	-.151	--	.192	-.117	-.129	.041
HINTVR$	-.047	.096	-.205	-.161	-.098	--	.157	-.024	-.081	-.020

STAT. BASIC STATS	Correlations, Casewise MD deletion, N=251 (whtsnd10.sta)								
Variable	MVISSX	MVISAGC	MNUMCH	HVISTM$	MNUMAD	MFRST	MBACKQ	HVISDT$	HINTVR$
INFO	.059	.011	.033	-.059	.076	-.069	.097	-.086	-.047
SIGN	.037	.034	-.005	-.115	.071	-.066	-.000	-.134	.096
DACNUM	.013	-.066	-.029	-.385	-.107	-.080	-.305	-.153	-.205
DACTIM	.011	-.050	.129	-.432	-.037	-.146	-.452	-.204	-.161
DSLLEQ	-.035	.000	.078	-.082	-.081	.073	-.143	-.151	-.098
OVERHD	--	--	--	--	--	--	--	--	--
MDISCLS	.088	-.070	-.009	.169	.036	-.051	.112	.192	.157
MSELCLS	-.073	-.037	.092	.005	-.080	.072	.021	-.117	-.024
DSLMAX	-.047	.025	.066	-.040	-.089	.085	-.052	-.129	-.081
MIMPNQ$	.099	.074	-.050	-.133	-.139	.004	-.118	.041	-.020
MVISSX	1.000	.051	-.005	-.089	-.047	.028	-.044	.056	-.065
MVISAGC	.051	1.000	.091	-.130	-.129	-.117	-.080	.023	-.251
MNUMCH	-.005	.091	1.000	.064	.066	-.123	.050	-.027	.101
HVISTM$	-.089	-.130	.064	1.000	.016	.093	.403	.070	.124
MNUMAD	-.047	-.129	.066	.016	1.000	.019	.307	.040	.132
MFRST	.028	-.117	-.123	.093	.019	1.000	.047	.029	.037
MBACKQ	-.044	-.080	.050	.403	.307	.047	1.000	.032	.128
HVISDT$	.056	.023	-.027	.070	.040	.029	.032	1.000	.092
HINTVR$	-.065	-.251	.101	.124	.132	.037	.128	.092	1.000

Figure C.6. Correlation Coefficients: Mediator vs. Mediator

APPENDIX D - REGIONS OF CERTAINTY FOR THE DOSE-RESPONSE RELATIONSHIPS

Appendix D. REGIONS OF CERTAINTY FOR THE DOSE-RESPONSE RELATIONSHIPS

Section D.1 summarizes the jackknifing procedure used to calculate the variances and covariances for the dose-respoonse curves in the main body of this report. Section D.2 presents the equations used to calculate regions of certainty, based on the variances and covariances. Finally, Section D.3 graphs the resulting regions of certainty for each of the four dose-response relationships in this study.

D.1 Computation of Variances and Covariances

The regions of certainty for each dose-response relationship are based on the variances of each variable in the relationship, plus the covariances between each combination of two variables in the relationship. The *covariance matrix* contains the complete set of variances and covariances for a given dose-response relationship.

The covariance matrix was computed through the statistical technique of *jackknifing*. This technique involves calculating coefficients for a number of subsets of the original data set. The covariance matrix is calculated based on the variation between the sets of coefficients calculated for the subsets.

The first step in jackknifing was to partition all respondents by the ten measurement site-days. Each group contained an average of approximately 40 respondents. Next, the regression coefficients of the final dose-response relationships were recomputed ten times, each time leaving out the respondents in one group. This resulted in ten sets of regression coefficients for each dose-response relationship.

Next, the covariance matrix was calculated from the jackknifed samples, in the standard manner. The covariance matrix from jackknifing constitutes the input for computation of the regions of certainty, as described in Section D.2. The jackknifed variances were typically a factor of two to four times greater than the estimates obtained from the software package Statistica used for the logistic regression.

D.2 Computations of Regions of Certainty

Given the covariance matrix obtained from jackknifing for each dose-response relationship, regions of 90-percent certainty may be calculated based on standard error-propagation mathematics.[1] The equations used are as follows:

$$p_{upper}=100\left[\frac{-b+\sqrt{b^2-4ac}}{2a}\right]$$

$$p_{lower}=100\left[\frac{-b-\sqrt{b^2-4ac}}{2a}\right]$$

1 Guttman, Irwin, S. S. Wilks and J. Stuart Hunter. *Introductory Engineering Statistics, Third Edition,* pp. 176-178. New York : John Wiley & Sons, 1982.

where

$$a = n + (1.645)^2$$

$$b = -\left(\frac{2pn}{100} + (1.645)^2\right)$$

$$c = n\left(\frac{p}{100}\right)^2$$

$$n = \frac{p(100-p)}{\sigma^2} \neq \text{ number of data points}$$

$$p = \frac{100\exp\left(\sum_{i=0}^{N} b_i x_i\right)}{1 + \exp\left(\sum_{i=0}^{N} b_i x_i\right)}$$

$$\sigma^2 = A^2\left[\sum_{i=0}^{N} x_i^2 \sigma^2_{b_i} + 2 \sum_{i=0,\ j=0,\ i>j}^{N} x_i x_j \sigma_{b_i b_j}\right]$$

$$A = \frac{p}{1 + \exp\left(\sum_{i=0}^{N} b_i x_i\right)}$$

x_i=the independent variables, $i=0,...,N$

$x_0=1$, the constant term

b_i=the fitted parameters of the regression

$\sigma^2_{b_i}$ and

$\sigma_{b_i b_j}$=the variances and covariances of the fitted parameters, b

D.3 Resulting regions of certainty

Figures D.1 through D.3 contain the resulting regions of certainty about each of the four dose-response relationships in this study. These regions of certainty, as well as their associated dose-response curves, are drawn for average values of the mediating variables—except they assume visitors remember *no* information about aircraft flights in the area.

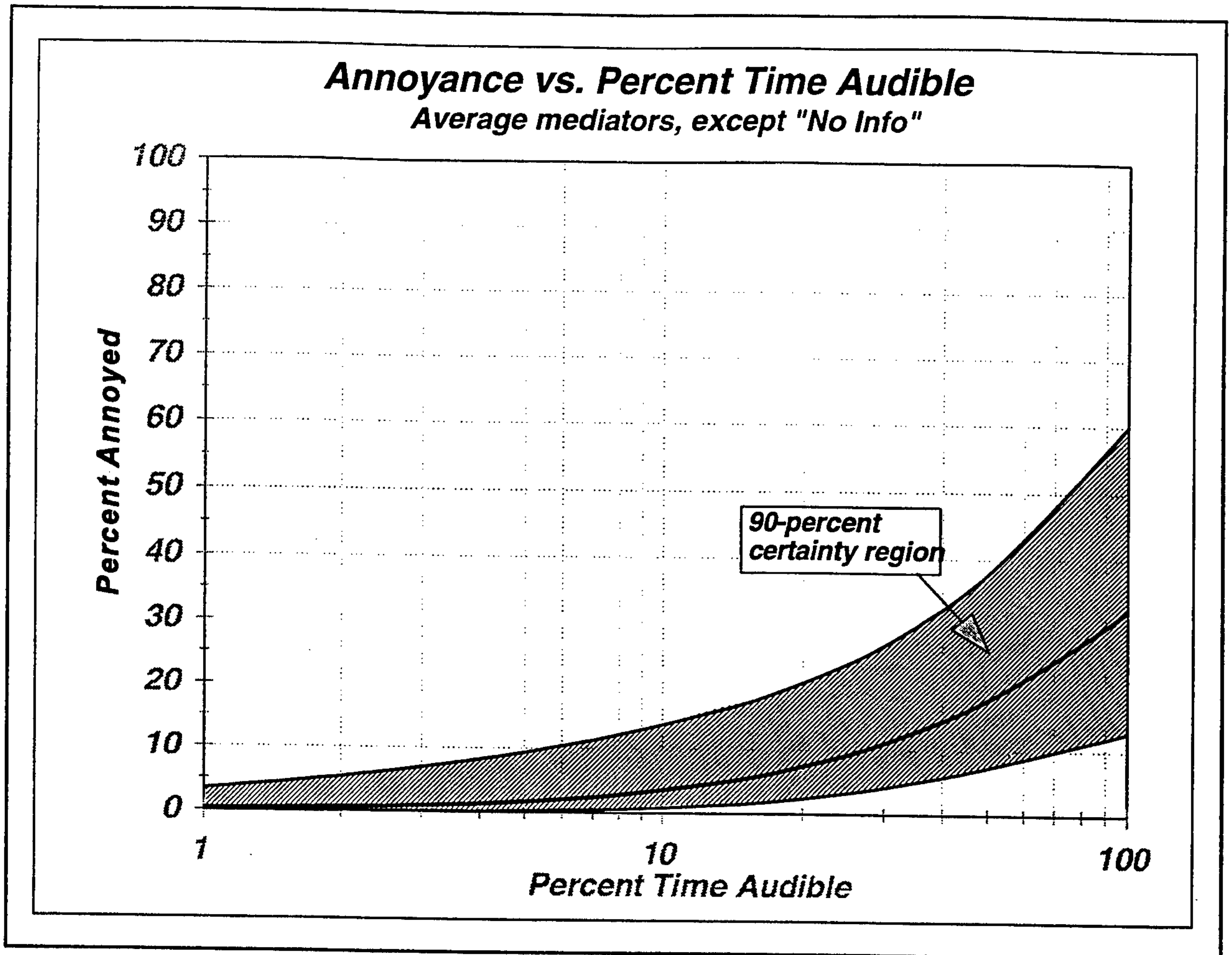

Figure D.1 Region of Certainty: Annoyance Due to Aircraft Sound vs. Percentage of Time that Aircraft Are Audible

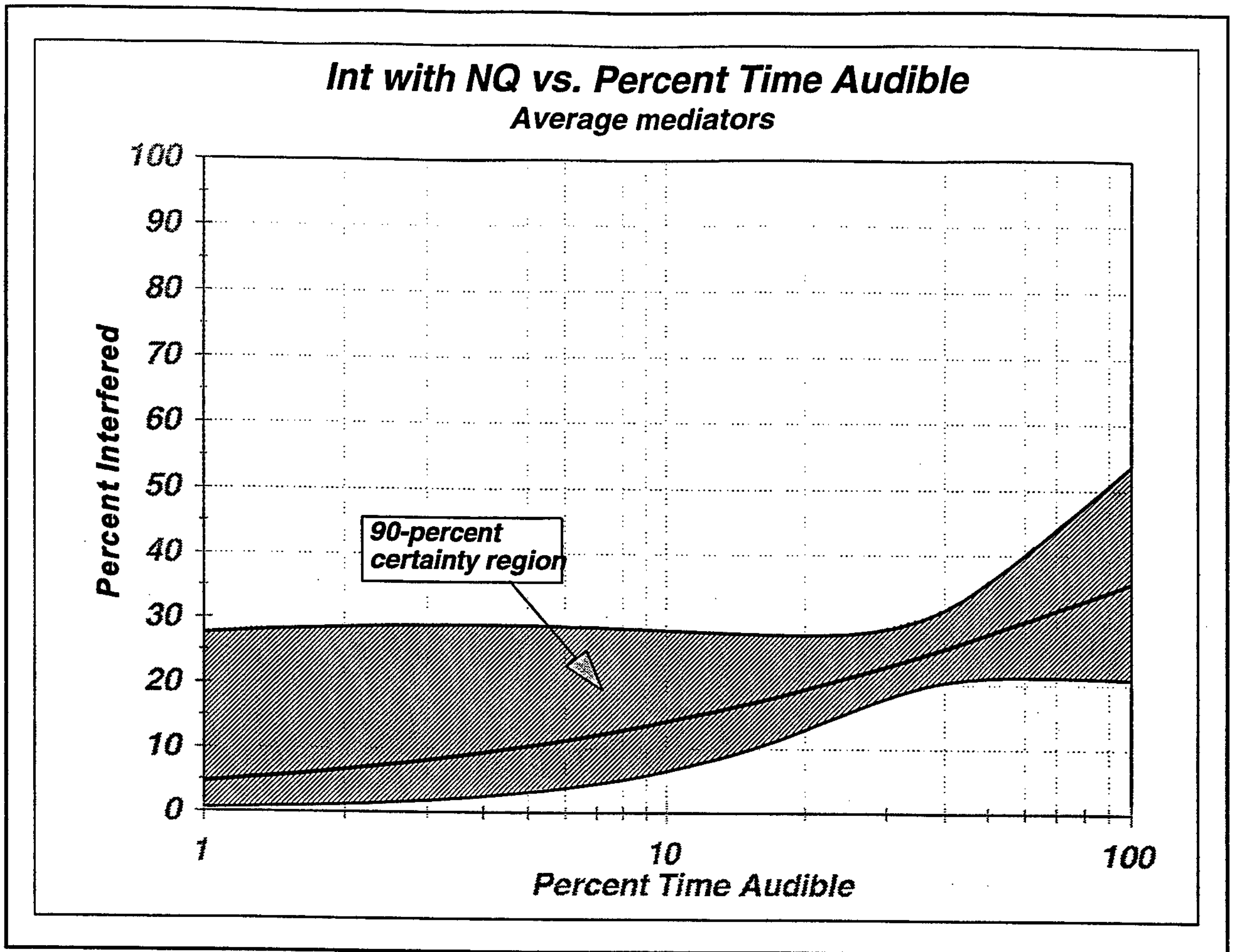

Figure D.2 Region of Certainty: Interference with Natural Quiet vs. Percentage of Time that Aircraft Are Audible

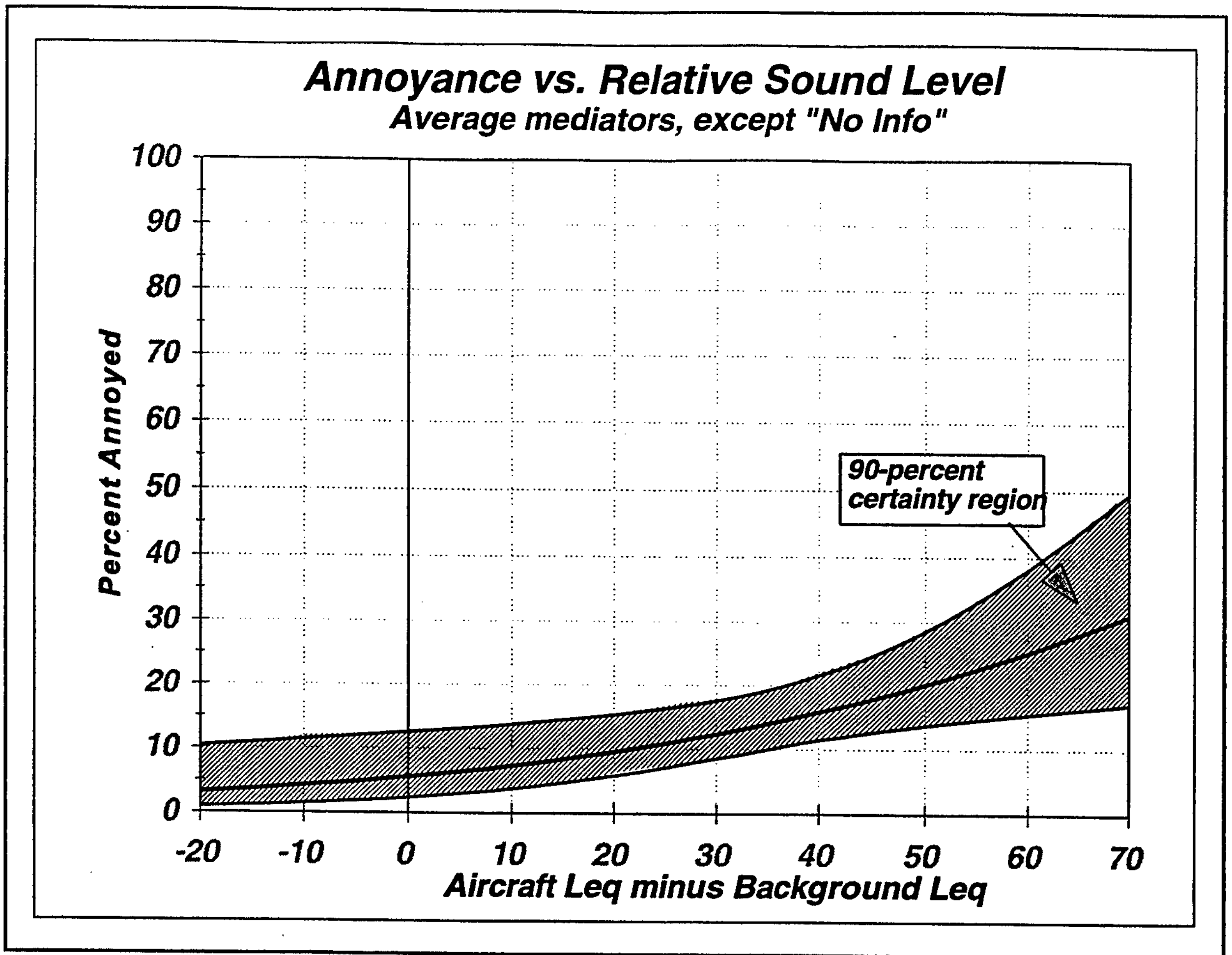

Figure D.3 Region of Certainty: Annoyance Due to Aircraft Sound vs. Relative Sound Level (Aircraft L_{eq} minus Background L_{eq})

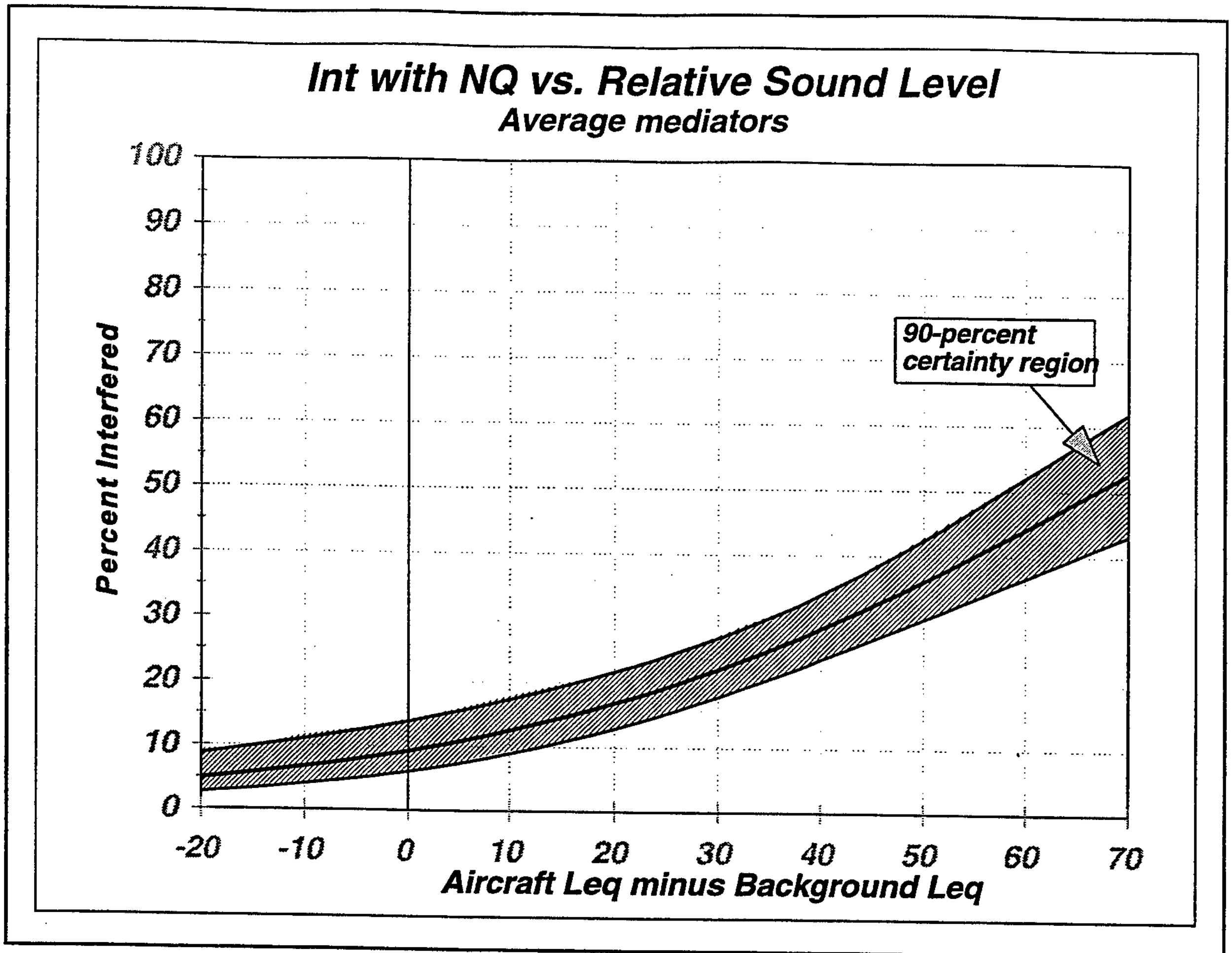

Figure D.4 Region of Certainty: Interference with Natural Quiet vs. Relative Sound Level (Aircraft L_{eq} minus Background L_{eq})

APPENDIX E - SUMMARY OF ALL REGRESSION COMPUTATIONS

Appendix E. SUMMARY OF ALL REGRESSION COMPUTATIONS

This appendix summarizes all the regression computations, separately for each of the four dose-response relationships. The summary tables on the following pages are organized as follows:

Rows: Each row summarizes one step in the regression process, in chronological order through each of the four dose-response regressions.

Columns:

Model: The sequential number of the regression model for this step in the analysis.

Individual coefficients and their statistics

- **Param:** Abbreviation for the parameter of interest.
- **From Statistica**
  - **Value:** Value of this parameter's regression coefficient.
  - **Std. Err.:** Standard error for this regression coefficient.
  - **Stud. t:** Student-t statistic for this standard error, relative to the parameter value.
  - **p:** Probability associated with the Student-t value.
- **Calculated 1 - p:** The resulting probability that the parameter's coefficient is significantly different from zero.
- **Criterion 1 - p:** The study's criterion for 1 - p.

The entire model and its statistics

- **Reference**
  - **Model:** The reference model, against which the current model is judged.
  - **-2LogLike:** Minus 2 times the log-likelihood achieved by Statistica for the reference model's regression.
- **From Statistica -2LogLike:** Minus 2 times the log-likelihood achieved by Statistica for this current model's regression.
- **Calculated**
  - **G:** The G statistic for this regression.
  - **Del df:** The change (delta) in the number of degrees of freedom in this regression, compared to that of the reference model.
  - **1 - p:** The resulting probability that this model is significantly better than the reference model.
- **Criterion 1 - p:** The study's criterion for 1 - p.
- **Conclusions about this model:** Conclusions based upon comparisons with criteria. The shaded regions show those particular values that most directly underlie these conclusions.

In each of these tables, the finally accepted model is darkly shaded the full width of the table. These darkly shaded regions contain the values of all final regression coefficients. In particular, they underlie all plots of the dose-response curves and the dose-response equations in Figure B.10 of Appendix B.

To simplify the numerical format of the equations in Figure B.10, we transformed the values of some coefficients, from their values in the tables of this current appendix to their values in Figure B.10. We show here, by example, how we transformed these values.

Example: Annoyance vs. Time (log percent) We derived the first equation in Figure B.10 from the coefficients in Model AT43, as follows:

- **Constant term:** The constant term in the equation, -5.98, equals CONST + CMVISSX in Model AT43. Numerically, -5.98 = -5.1972 - 0.7856 = -5.9828, rounded to two decimal places. This adjustment of CONST to CONST+CMVISSX was necessary because the "gender" mediator (MVISSX) was coded in the database as man=1 and woman=2, instead of man=0 and woman=1 as is the more common to code a categorical variable in logistic regression. Because of the 1-and-2 coding, a man visitor would evaluate to -0.7856 times 1, which equals -0.7856, while a woman visitor would evaluate to -0.7856 times 2, which equals -1.5712. By moving -0.7856 of this -1.5712 into the constant term in the dose-response equation, we then allow ourselves to use, with the equation, a values of 0 for men and -0.7856 for women. This allows the gender term in the final dose-response equation to be for women, only, without the need for another "man" term.
- **Dose term:** The dose term in the equation, +2.55, equals CDACTIML, rounded to two decimal places.
- **Information term:** The information term in the equation, -0.0109, equals CINFOYN/100. Division by 100 is needed to allow equation input in percentages (0 to 100), rather than in fractional values (0 to 1).
- **Natural quiet term:** The natural quiet information term in the equation, +0.0123, equals CMIMPNQD/100. Division by 100 is needed to allow equation input in percentages (0 to 100), rather than in fractional values (0 to 1).
- **Children term:** The children term in the equation, -0.0073, equals CMNUMCHD/100. Division by 100 is needed to allow equation input in percentages (0 to 100), rather than in fractional values (0 to 1).

- **Gender term:** The gender term in the equation, -0.0079, equals CMVISSX/100. Division by 100 is needed to allow equation input in percentages (0 to 100), rather than in fractional values (0 to 1).

The full regression summaries follow:

- **Annoyance vs. Time (log percent)**
- **Interference with Natural Quiet vs. Time (log percent)**
- **Annoyance vs. Relative Sound Level (Aircraft Leq minus Background Leq)**
- **Interference with Natural Quiet vs. Relative Sound Level (Aircraft Leq minus Background Leq)**

Model	Purpose	Param	Individual coefficients and their statistics: From Statistica Value	Std. Err.	Stud. t	p	Calculated 1 - p	Criterion 1 - p	The entire model and its statistics: Reference Model	Reference - 2LogLike	From Statistica - 2LogLike	Calculated G	Del df	1 - p	Criterion 1 - p	Conclusions about this model
AT1	Null	CONST	-2.0761	0.1513	-13.72	0.000	1.000	0.85	-------	----------	232.086	----------	----------	----------	----------	This is the "null" model, using only the constant in the regression.
AT2	Try	CONST	-5.9102	1.9831	-2.98	0.003	0.997	0.85	AT1	232.086	218.087	13.999	1	1.000	0.90	Accept DACTIML
	DACTIML	CDACTIML	2.4698	1.0509	2.35	0.019	0.981	0.85								
AT3	Try	TOP	0.2838	?					AT2	218.087	217.695	0.392	1	0.469	0.90	Reject Top for DACTIML, alone.
	Top	CONST	-6.1752	?												
		CDACTIML	3.7718	?												
AT4	Try	CONST	-6.0094	1.8196	-3.30	0.001	0.999	0.85	AT2	218.087	216.668	1.419	2	0.508	0.90	Reject OHNOST, OHSOMEST. But test OVERHD, as well.
	OHNOST	CDACTIML	2.1401	0.9611	2.23	0.027	0.973	0.85								
	OHSOMEST	COHNOST	0.6926	0.5462	1.27	0.206	0.794	0.85								
		COHSOMES	0.7417	0.5438	1.36	0.174	0.826	0.85								
AT5	Try	CONST	-6.0151	1.8393	-3.27	0.001	0.999	0.85	AT2	218.087	216.686	1.401	1	0.763	0.90	Reject OVERHD.
	OVERHD	CDACTIML	2.1441	0.9697	2.21	0.028	0.972	0.85								
		COVERHD	0.7173	0.5230	1.37	0.171	0.829	0.85								
AT6	Try	CONST	-5.7325	?					AT2	218.087	210.514	7.573	2	0.977	0.90	INFONPS / INFOOTH improve the regression significantly, but the coefficients confound one another. Perhaps the two overhead coefficients confound each other. Test this next.
	INFONPS	CDACTIML	2.6052	?												
	INFOOTH	CINFONPS	-1.0356	?												
		CINFOOTH	-1.0374	?												
AT7	Try	CONST	-5.7603	1.1176	-5.15	0.000	1.000	0.85	AT2	218.087	210.515	7.572	1	0.994	0.90	Accept INFOYN
	INFOYN	CDACTIML	2.6222	0.6666	3.93	0.000	1.000	0.85								
		CINFOYN	-1.0370	0.3185	-3.26	0.001	0.999	0.85								
AT8	Try	TOP	17.3880	37,473.8144	0.00	1.000	0.000	0.85	AT7	210.515	210.514	0.001	1	0.025	0.90	Reject Top at this stage in the analysis.
	Top	CONST	-5.7323	1.5188	-3.77	0.000	1.000	0.85								
		CDACTIML	2.6050	0.8510	3.06	0.002	0.998	0.85								
		CINFOYN	-1.0366	0.3277	-3.16	0.002	0.998	0.85								
AT9	Try	CONST	-5.7594	?					AT7	210.515	210.491	0.024	1	0.123	0.90	Reject SIGN.
	SIGN	CDACTIML	2.6091	?												
		CINFOYN	-1.0591	?												
		CSIGN	0.0583	?												
AT10	Try	CONST	-4.3450	1.5307	-2.84	0.005	0.995	0.85	AT7	210.515	179.723	30.792	1	1.000	0.90	Accept MDISCLS, but first check MSELCLS to see if better.
	MDISCLS	CDACTIML	2.2543	0.8380	2.69	0.008	0.992	0.85								
		CINFOYN	-1.1044	0.3586	-3.08	0.002	0.998	0.85								
		CMDISCLS	-0.0001	0.0001	-1.76	0.080	0.920	0.85								
AT11	Try	CONST	-5.6858	1.9668	-2.89	0.004	0.996	0.85	AT7	210.515	182.670	27.845	1	1.000	0.90	Reject MSELCLS. But before accepting MDISCLS, rerun Model 7 with visitors filtered out if they don't have a MDISCLS. This will test to see if part of the improvement from MDISCLS comes from only analyzing visitors with overhead flights.
	MSELCLS	CDACTIML	2.5419	0.8260	3.08	0.002	0.998	0.85								
		CINFOYN	-1.1547	0.3627	-3.18	0.002	0.998	0.85								
		CMSELCLS	0.0021	0.0171	0.12	0.904	0.096	0.85								
AT12	AT7 but only visitors with OH flights	CONST	-5.6001	1.7354	-3.23	0.001	0.999	0.85	AT2	217.695	182.686	35.009	1	1.000	0.90	So can get essentially the same improvement in the model by (1) adding MDISCLS or (2) alternatively filtering out non-overhead visitors. Through filtering, we reduce the number of samples from 332 to 254, a loss of 78 visitors (23%). Before deciding how to proceed, regress MDISCLS and MSELCLS alone, without DACTIML or INFOYN, to see what happens.
		CDACTIML	2.6031	0.9867	2.64	0.009	0.991	0.85								
		CINFOYN	-1.1621	0.3691	-3.15	0.002	0.998	0.85								
AT13	MDISCLS alone	CONST	-0.7132	0.4383	-1.63	0.105	0.895	0.85	AT1	232.086	193.177	38.909	1	1.000	0.90	MDISCLS good, alone. See next model.
		CMDISCLS	-0.0002	0.0001	-2.56	0.011	0.989	0.85								

Annoyance vs. Time (log percent)
294470.03 White Sands Regression History

		Individual coefficients and their statistics							The entire model and its statistics							
			From Statistica				Calculated	Criterion	Reference		From Statistica	Calculated			Criterion	
Model	Purpose	Param	Value	Std. Err.	Stud. t	p	1 - p	1 - p	Model	- 2LogLike	- 2LogLike	G	Del df	1 - p	1 - p	Conclusions about this model
AT14	DACTIML but only visitors with OH flights	CONST	-5.7354	3.1264	-1.83	0.068	0.932	0.85	AT1	230.655	191.258	39.397	1	1.000	0.90	This is DACTIML with overhead visitors, only. It is slightly better than MDISCLS alone (previous case). The opposite would have been a big surprise. We still must decide whether or not to let MDISCLS enter, knowing that allowing it will also filter out all visitors without overhead flights. Since we are primarily interested in overhead-flight impact, anyway, and since OVERHD was not significant, then: Accept MDISCLS, based on Model AT10.
		CDACTIML	2.4095	1.6536	1.46	0.146	0.854	0.85								
AT15	Try DSLLEQ only OHs	CONST	-3.9701	1.9502	-2.04	0.043	0.957	0.85	AT10	179.723	179.764	-0.041	1	ERR	0.90	Reject DSLLEQ. ERR probably caused by different method of seeking convergence (of no matter). Next try again, however, without any filter on.
		CDACTIML	2.2318	0.8575	2.60	0.010	0.990	0.85								
		CINFOYN	-1.0993	0.3595	-3.06	0.002	0.998	0.85								
		CMDISCLS	-0.0001	0.0001	-1.89	0.059	0.941	0.85								
		CDSLLEQ	-0.0038	0.0231	-0.17	0.869	0.131	0.85								
AT16	Try DSLLEQ all visitors	CONST	-3.9041	1.9409	-2.01	0.045	0.955	0.85	AT10	179.723	179.745	-0.022	1	ERR	0.90	Still strange that G increased when DSLLEQ added. Next try AT10 again (same as here, but without DSLLEQ).
		CDACTIML	2.1225	0.8435	2.52	0.012	0.988	0.85								
		CINFOYN	-1.0893	0.3568	-3.05	0.003	0.997	0.85								
		CMDISCLS	-0.0001	0.0001	-1.82	0.070	0.930	0.85								
		CDSLLEQ	-0.0024	0.0230	-0.11	0.915	0.085	0.85								
AT17 AT10	Baseline for AT16	CONST	-4.3450	1.5307	-2.84	0.005	0.995	0.85	AT10	179.723	179.723	0.000	1	0.000	0.90	Same results as AT10. I don't know why adding DSLLEQ actually makes the fit slightly worse, but it does. In any case: Reject DSLLEQ, based upon AT15.
		CDACTIML	2.2543	0.8380	2.69	0.008	0.992	0.85								
		CINFOYN	-1.1044	0.3586	-3.08	0.002	0.998	0.85								
		CMDISCLS	-0.0001	0.0001	-1.76	0.080	0.920	0.85								
AT18	Try Top	TOP	-0.4867	?					AT10	179.723	179.382	0.341	1	0.441	0.90	Reject Top at this stage in the analysis. Next wish to investigate closest distance more finely, through log distance. So make new variable: MDCLLOG = log10(MDISCLS).
		CONST	-4.4874	?												
		CDACTIML	3.5221	?												
		CINFOYN	-1.5892	?												
		CMDISCLS	-0.0002	?												
AT19	Try MDCLLOG	CONST	0.4915	5.0850	0.10	0.923	0.077	0.85	AT7	210.515	180.341	30.174	1	1.000	0.90	Logged closest distance (MDCLLOG) not as good as linear closest distance (MDISCLS), which is AT10. Next must choose between filtering out non-OH visitors or retaining MDISCLS.
		CDACTIML	2.2443	0.7954	2.82	0.005	0.995	0.85								
		CINFOYN	-1.1103	0.3687	-3.01	0.003	0.997	0.85								
		CMDCLLOG	-1.4666	1.3946	-1.05	0.294	0.706	0.85								
AT20	AT10 re AT12	CONST	-4.3450	1.5307	-2.84	0.005	0.995	0.85	AT12	182.686	179.723	2.963	1	0.915	0.90	So even with OH filter, MDISCLS seems to be needed in regression. For this reason, leave filter out and accept MDISCLS for good. Next: Histogram shows outlier values of MDISCLS beyond 12000 feet. These could be affecting the regression, so filter them out and redo AT10.
		CDACTIML	2.2543	0.8380	2.69	0.008	0.992	0.85								
		CINFOYN	-1.1044	0.3586	-3.08	0.002	0.998	0.85								
		CMDISCLS	-0.0001	0.0001	-1.76	0.080	0.920	0.85								
AT21	AT10 without outliers (MDISCLS >12,000 ft)	CONST	-4.0243	1.7102	-2.35	0.019	0.981	0.85	AT7	210.515	173.086	37.429	1	1.000	0.90	Coefficient is only marginally good. In addition, coefficients shifted somewhat. So this means the outliers influenced the regression beyond their numbers, and when left out, the coefficient is not significantly different from zero. As a result, change our minds and eliminate MDISCLS from the regression. The effect of MDISCLS was very small, in any case, and it resulted in a loss of 23% of the data.
		CDACTIML	2.1232	0.8827	2.41	0.017	0.983	0.85								
		CINFOYN	-1.0263	0.3716	-2.76	0.006	0.994	0.85								
		CMDISCLS	-0.0001	0.0001	-1.35	0.179	0.821	0.85								
IGNORE FROM AT22 THROUGH AT33																
AT22	Try MVISSX	CONST	-4.5625	1.3455	-3.39	0.001	0.999	0.85	AT7	210.515	198.285	12.230	1	1.000	0.90	Accept MVISSX (multiplies odds by 2).
		CDACTIML	2.5238	0.7461	3.38	0.001	0.999	0.85								
		CINFOYN	-0.9095	0.3267	-2.78	0.006	0.994	0.85								
		CMVISSX	-0.7369	0.3207	-2.30	0.022	0.978	0.85								
AT23	Try	TOP	19.8329	36,490.8623	0.00	1.000	0.000	0.85	AT22	198.285	198.285	0.000	1	0.000	0.90	Reject Top at this stage in the analysis.
		CONST	-4.5625	1.3366	-3.41	0.001	0.999	0.85								
		CDACTIML	2.5238	0.7418	3.40	0.001	0.999	0.85								
		CINFOYN	-0.9095	0.3270	-2.78	0.006	0.994	0.85								
		CMVISSX	-0.7369	0.3211	-2.30	0.022	0.978	0.85								

Annoyance vs. Time (log percent)
294470.03 White Sands Regression History

		Individual coefficients and their statistics							The entire model and its statistics							
			From Statistica				Calculated	Criterion	Reference		From Statistica	Calculated			Criterion	
Model	Purpose	Param	Value	Std. Err.	Stud. t	p	1 - p	1 - p	Model	- 2LogLike	- 2LogLike	G	Del df	1 - p	1 - p	Conclusions about this model
AT24	Try	CONST	-4.0776	1.3555	-3.01	0.003	0.997	0.85	AT22	198.285	197.233	1.052	1	0.695	0.90	Reject MVISAGC.
	MVISAGC	CDACTIML	2.4343	0.7266	3.35	0.001	0.999	0.85								
		CINFOYN	-0.9199	0.3266	-2.82	0.005	0.995	0.85								
		CMVISSX	-0.7043	0.3221	-2.19	0.030	0.970	0.85								
		CMVISAGC	-0.1656	0.1314	-1.26	0.209	0.791	0.85								
AT25	Try	CONST	-4.6343	1.5110	-3.07	0.002	0.998	0.85	AT22	198.285	197.233	1.052	1	0.695	0.90	Reject MFRST.
	MFRST	CDACTIML	2.5288	0.7553	3.35	0.001	0.999	0.85								
		CINFOYN	-0.9064	0.3275	-2.77	0.006	0.994	0.85								
		CMVISSX	-0.7376	0.3214	-2.30	0.022	0.978	0.85								
		CMFRST	0.0698	0.5467	0.13	0.899	0.101	0.85								
AT26	Try	CONST	-4.4660	1.3436	-3.32	0.001	0.999	0.85	AT22	198.285	195.083	3.202	1	0.926	0.90	Accept MNUMCHD1.
	MNUMCHD1	CDACTIML	2.6236	0.7557	3.47	0.001	0.999	0.85								
		CINFOYN	-0.9768	0.3300	-2.96	0.003	0.997	0.85								
		CMVISSX	-0.6921	0.3205	-2.16	0.032	0.968	0.85								
		CMNUMCHD	-0.6797	0.3140	-2.16	0.031	0.969	0.85								
AT27	Try	TOP	19.9842	41.216.5024	0.00	1.000	0.000	0.85	AT26	195.083	195.083	0.000	1	0.000	0.90	Reject Top at this stage of the analysis.
	Top	CONST	-4.4660	1.3246	-3.37	0.001	0.999	0.85								
		CDACTIML	2.6236	0.7457	3.52	0.001	0.999	0.85								
		CINFOYN	-0.9768	0.3301	-2.96	0.003	0.997	0.85								
		CMVISSX	-0.6921	0.3208	-2.16	0.032	0.968	0.85								
		CMNUMCHD	-0.6797	0.3142	-2.16	0.031	0.969	0.85								
AT28	Try	CONST	-4.4861	1.3507	-3.32	0.001	0.999	0.85	AT26	195.083	195.047	0.036	1	0.150	0.90	Reject MNUMADD3.
	MNUMADD3	CDACTIML	2.6146	0.7568	3.45	0.001	0.999	0.85								
		CINFOYN	-0.9689	0.3319	-2.92	0.004	0.996	0.85								
		CMVISSX	-0.6870	0.3216	-2.14	0.033	0.967	0.85								
		CMNUMCHD	-0.6852	0.3154	-2.17	0.031	0.969	0.85								
		CMNUMADD	0.0741	0.3128	0.24	0.813	0.187	0.85								
AT29	Try	CONST	-4.3104	?					AT26	195.083	194.368	0.715	1	0.602	0.90	Reject DACNUM.
	DACNUM	CDACTIML	2.4037	?												
		CINFOYN	-1.0164	?												
		CMVISSX	-0.6983	?												
		CNUMCHD	-0.6835	?												
		CDACNUM	0.0292	?												
AT30	Try	CONST	-3.9367	1.4503	-2.71	0.007	0.993	0.85	AT26	195.083	194.733	0.350	1	0.446	0.90	Reject HVISTM.
	HVISTM	CDACTIML	2.4965	0.7154	3.49	0.001	0.999	0.85								
		CINFOYN	-0.9889	0.3278	-3.02	0.003	0.997	0.85								
		CMVISSX	-0.6984	0.3195	-2.19	0.030	0.970	0.85								
		CMNUMCHD	-0.6516	0.3147	-2.07	0.039	0.961	0.85								
		CHVISTM	-0.2507	0.3538	-0.71	0.479	0.521	0.85								
AT31	Try	CONST	-5.1972	1.3644	-3.81	0.000	1.000	0.85	AT26	195.083	195.552	-0.469	1	ERR	0.90	Reject MIMPNQDV. Coefficients look okay but MIMPNQDV doesn't improve model at all. Negative G implies slightly different convergence paths during regression.
	MIMPNQDV	CDACTIML	2.5468	0.7138	3.57	0.000	1.000	0.85								
		CINFOYN	-1.0903	0.3236	-3.37	0.001	0.999	0.85								
		CMVISSX	-0.7856	0.3096	-2.54	0.012	0.988	0.85								
		CMNUMCHD	-0.7302	0.3049	-2.39	0.017	0.983	0.85								
		CMIMPNQD	1.2291	0.4417	2.78	0.006	0.994	0.85								
AT32	Try	CONST	-5.0000	1.3109	-3.81	0.000	1.000	0.85	AT26	195.083	200.971	-5.888	1	ERR	0.90	Reject MIMPSCDV. Did not converge, which is confirmation not to accept MIMPSCDV. This negative G looks quite high. In the next model, reconfirm AT26.
	MIMPSCDV	CDACTIML	2.6442	0.6682	3.96	0.000	1.000	0.85								
		CINFOYN	-1.0747	0.3207	-3.35	0.001	0.999	0.85								
		CMVISSX	-0.7495	0.3097	-2.42	0.016	0.984	0.85								
		CMNUMCHD	-0.7066	0.3047	-2.32	0.021	0.979	0.85								
		CMIMPSCD	0.6247	0.6215	1.01	0.316	0.684	0.85								
AT33	Duplicate	CONST	-4.4578	2.2742	-1.96	0.051	0.949	0.85	AT26	195.083	201.629	-6.546	1	ERR	0.90	Did not confirm with same LogLikelihood using Quasi-Newton convergence. Examined detailed logs and found that MDISCLS <=12000 was used for AT22 through AT30, though should not have been after its use in AT21. So must repeat from AT22 on.
	AT26 baseline	CDACTIML	2.6791	1.2715	2.11	0.036										
		CINFOYN	-1.0476	0.3521	-2.98	0.003										
		CMVISSX	-0.7555	0.3160	-2.39	0.017										
		CMNUMCHD	-0.7605	0.3253	-2.34	0.020										

		Individual coefficients and their statistics							The entire model and its statistics							
			From Statistica				Calculated	Criterion	Reference		From Statistica	Calculated			Criterion	
Model	Purpose	Param	Value	Std. Err.	Stud. t	p	1 - p	1 - p	Model	- 2LogLike	- 2LogLike	G	Del df	1 - p	1 - p	Conclusions about this model
PICK UP HERE AGAIN, AFTER CORRECTION OF FILTERING PROBLEM																
AT34	Try MVISSX again	CONST	-4.5488	1.2905	-3.52	0.000	1.000	0.85	AT7	210.515	205.751	4.764	1	0.971	0.90	Accept MVISSX
		CDACTIML	2.5597	0.7160	3.57	0.000	1.000	0.85								
		CINFOYN	-0.9815	0.3203	-3.06	0.002	0.998	0.85								
		CMVISSX	-0.8069	0.3121	-2.59	0.010	0.990	0.85								
AT35	Try Top	TOP	22.02066	103,142.8253	0.00	1.000	0.000	0.85	AT34	205.751	205.751	0.000	1	0.000	0.90	Reject Top at this stage in the analysis.
		CONST	-4.54882	1.2869	-3.53	0.000	1.000	0.85								
		CDACTIML	2.55968	0.7143	3.58	0.000	1.000	0.85								
		CINFOYN	-0.98145	0.3207	-3.06	0.002	0.998	0.85								
		CMVISSX	-0.80691	0.3124	-2.58	0.010	0.990	0.85								
AT36	Try Visitor age, in decades	CONST	-4.2806	1.7936	-2.39	0.018	0.982	0.85	AT34	205.751	203.227	2.524	3	0.529	0.99	Reject Visitor age in Decades. However, there is a difference between the oldest and youngest age groups. Compared to those over 50 years of age, visitors 30 years or less divide odds by 2.0, equivalent to dividing DACTIM by 1.9.
		CDACTIML	2.5366	0.9793	2.59	0.010	0.990	0.85								
		CINFOYN	-0.9626	0.3318	-2.90	0.004	0.996	0.85								
		CMVISSX	-0.7800	0.3184	-2.45	0.015	0.985	0.85								
		CMVISAG3	-0.5426	0.4213	-1.29	0.199	0.801	0.85								
		CMVISAG4	-0.1077	0.3761	-0.29	0.775	0.225	0.85								
		CMVISAG5	-0.7026	0.4167	-1.69	0.093	0.907	0.85								
AT37	Try MFRST	CONST	-4.7274	1.4905	-3.17	0.002	0.998	0.85	AT34	205.751	205.691	0.060	1	0.194	0.90	Reject MFRST.
		CDACTIML	2.5776	0.7344	3.51	0.001	0.999	0.85								
		CINFOYN	-0.9707	0.3215	-3.02	0.003	0.997	0.85								
		CMVISSX	-0.8080	0.3127	-2.58	0.010	0.990	0.85								
		CMFRST	0.1619	0.5370	0.30	0.763	0.237	0.85								
AT38	Try MNUMCHD1	CONST	-4.4578	2.2742	-1.96	0.051	0.949	0.85	AT34	205.751	201.629	4.122	1	0.958	0.90	Accept MNUMCHD1
		CDACTIML	2.6791	1.2715	2.11	0.036	0.964	0.85								
		CINFOYN	-1.0476	0.3521	-2.98	0.003	0.997	0.85								
		CMVISSX	-0.7555	0.3160	-2.39	0.017	0.983	0.85								
		CMNUMCHD	-0.7605	0.3253	-2.34	0.020	0.980	0.85								
AT39	Try Top	TOP	21.6680	119,543.3945	0.00	1.000	0.000	0.85	AT38	201.629	201.629	0.000	1	0.000	0.90	Reject Top at this stage in the analysis.
		CONST	-4.4578	2.2494	-1.98	0.048	0.952	0.85								
		CDACTIML	2.6791	1.2576	2.13	0.034	0.966	0.85								
		CINFOYN	-1.0476	0.3517	-2.98	0.003	0.997	0.85								
		CMVISSX	-0.7555	0.3164	-2.39	0.018	0.982	0.85								
		CMNUMCHD	-0.7605	0.3251	-2.34	0.020	0.980	0.85								
AT40	Try MNUMADD3	CONST	-4.4651	?					AT38	201.629	201.624	0.005	1	0.056	0.90	Reject MNUMADD3.
		CDACTIML	2.6759	?												
		CINFOYN	-1.0447	?												
		CMVISSX	-0.7541	?												
		CMNUMCHD	-0.7622	?												
		CMNUMADD	0.0266	?												
AT41	Try DACNUM	CONST	-4.2892	?					AT38	201.629	200.786	0.843	1	0.641	0.90	Reject DACNUM.
		CDACTIML	2.4338	?												
		CINFOYN	-1.0864	?												
		CMVISSX	-0.7607	?												
		CMNUMCHD	-0.7530	?												
		MDACNUM	0.0320	?												
AT42	Try HVISTM	CONST	-3.7337	1.4857	-2.51	0.012	0.988	0.85	AT38	201.629	201.061	0.568	1	0.549	0.90	Reject HVISTM.
		CDACTIML	2.5014	0.7331	3.41	0.001	0.999	0.85								
		CINFOYN	-1.0609	0.3226	-3.29	0.001	0.999	0.85								
		CMVISSX	-0.7749	0.3127	-2.48	0.014	0.986	0.85								
		CMNUMCHD	-0.7366	0.3066	-2.40	0.017	0.983	0.85								
		CHVISTM	-0.3234	0.3449	-0.94	0.349	0.651	0.85								

		Individual coefficients and their statistics							The entire model and its statistics							
			From Statistica				Calculated	Criterion	Reference		From Statistica	Calculated			Criterion	
Model	Purpose	Param	Value	Std. Err.	Stud. t	p	1 - p	1 - p	Model	- 2LogLike	- 2LogLike	G	Del df	1 - p	1 - p	Conclusions about this model
AT43	Try MIMPNQDV	CONST	-5.1972	1.3644	-3.81	0.000	1.000	0.85	AT38	201.629	195.552	6.077	1	0.986	0.90	Accept MIMPNQDV
		CDACTIML	2.5468	0.7138	3.57	0.000	1.000	0.85								
		CINFOYN	-1.0903	0.3236	-3.37	0.001	0.999	0.85								
		CMVISSX	-0.7856	0.3096	-2.54	0.012	0.988	0.85								
		CMNUMCHD	-0.7302	0.3049	-2.39	0.017	0.983	0.85								
		CMIMPNQD	1.2291	0.4417	2.78	0.006	0.994	0.85								
AT44	Try Top	TOP	-0.3862	?					AT43	195.552	194.370	1.182	1	0.723	0.90	Reject Top at this stage of the analysis.
		CONST	-5.2053	?												
		CDACTIML	3.5251	?												
		CINFOYN	-1.7121	?												
		CMVISSX	-1.0769	?												
		CMNUMCHD	-1.3106	?												
		CMIMPNQD	2.0546	?												
AT45	Try MIMPSCQD	CONST	-5.3303	1.3294	-4.01	0.000	1.000	0.85	AT43	195.552	195.508	0.044	1	0.166	0.90	Reject MIMPSCQD.
		CDACTIML	2.4653	0.6442	3.83	0.000	1.000	0.85								
		CINFOYN	-1.1389	0.3237	-3.52	0.000	1.000	0.85								
		CMVISSX	-0.7742	0.3088	-2.51	0.013	0.987	0.85								
		CMNUMCHD	-0.7565	0.3069	-2.46	0.014	0.986	0.85								
		CMIMPNQD	1.3398	0.4604	2.91	0.004	0.996	0.85								
		CMIMPSCD	0.1909	0.6111	0.31	0.755	0.245	0.85								
AT46	Try MIMPHCQD	CONST	-5.1389	1.2151	-4.23	0.000	1.000	0.85	AT43	195.552	194.157	1.395	1	0.762	0.90	Reject MIMPHCQD.
		CDACTIML	2.5413	0.6503	3.91	0.000	1.000	0.85								
		CINFOYN	-1.0790	0.3204	-3.37	0.001	0.999	0.85								
		CMVISSX	-0.6845	0.3139	-2.18	0.030	0.970	0.85								
		CMNUMCHD	-0.7071	0.3032	-2.33	0.020	0.980	0.85								
		CMIMPNQD	1.3598	0.4469	3.04	0.003	0.997	0.85								
		CMIMPHCD	-0.4939	0.3058	-1.61	0.107	0.893	0.85								
AT47	Try DSLMAX	CONST	-5.9678	1.6227	-3.68	0.000	1.000	0.85	AT43	195.552	193.956	1.596	1	0.794	0.90	Reject DSLMAX.
		CDACTIML	2.1746	0.7409	2.94	0.004	0.996	0.85								
		CINFOYN	-1.0936	0.3258	-3.36	0.001	0.999	0.85								
		CMVISSX	-0.8164	0.3132	-2.61	0.010	0.990	0.85								
		CMNUMCHD	-0.6840	0.3070	-2.23	0.027	0.973	0.85								
		CMIMPNQD	1.1977	0.4469	2.68	0.008	0.992	0.85								
		MDSLMAX	0.0185	0.0121	1.53	0.127	0.873	0.85								
AT48	Try Specific interviewer	CONST	-5.5013	1.2899	-4.26	0.000	1.000	0.85	AT43	195.552	190.861	4.691	3	0.804	0.99	Reject Specific Interviewer.
		CDACTIML	2.4348	0.6578	3.70	0.000	1.000	0.85								
		CINFOYN	-1.0686	0.3180	-3.36	0.001	0.999	0.85								
		CMVISSX	-0.7000	0.3114	-2.25	0.025	0.975	0.85								
		CMNUMCHD	-0.6725	0.3027	-2.22	0.027	0.973	0.85								
		CMIMPNQD	1.3934	0.4502	3.10	0.002	0.998	0.85								
		CHINT2	0.6511	0.4188	1.55	0.121	0.879	0.85								
		CHINT3	0.3824	0.3442	1.11	0.267	0.733	0.85								
		CHINT4	-1.1265	0.7860	-1.43	0.153	0.847	0.85								
AT49	Try D*I in full model	CONST	-5.3470	1.7273	-3.10	0.002	0.998	0.85	AT43	195.552	195.519	0.033	1	0.144	0.99	Reject DACTIML * INFOYN in full model.
		CDACTIML	2.6359	0.9260	2.85	0.005	0.995	0.85								
		CINFOYN	-0.5597	2.4633	-0.23	0.820	0.180	0.85								
		CMVISSX	-0.7805	0.3104	-2.51	0.012	0.988	0.85								
		CMNUMCHD	-0.7338	0.3083	-2.38	0.018	0.982	0.85								
		CMIMPNQD	1.2305	0.4463	2.76	0.006	0.994	0.85								
		CDI	-0.3260	1.5231	-0.21	0.831	0.169	0.85								
AT50	Try D*I in sparse model	CONST	-5.9582	2.2098	-2.70	0.007	0.993	0.85	AT7	210.515	210.437	0.078	1	0.220	0.99	Reject DACTIML * INFOYN in sparse model.
		CDACTIML	2.7451	1.2435	2.21	0.028	0.972	0.85								
		CINFOYN	-0.2255	2.8612	-0.08	0.937	0.063	0.85								
		CDI	-0.4963	1.7900	-0.28	0.782	0.218	0.85								

Model	Purpose	Param	Individual coefficients and their statistics: From Statistica Value	Std. Err.	Stud. t	p	Calculated 1 - p	Criterion 1 - p	The entire model and its statistics: Reference Model	Reference - 2LogLike	From Statistica - 2LogLike	Calculated G	Del df	Calculated 1 - p	Criterion 1 - p	Conclusions about this model
AT51	Try	CONST	-11.0977	?					AT43	195.552	193.139	2.413	1	0.880	0.99	Reject DACTIML * MVISSX in full model.
	D*X in full	CDACTIML	6.2340	?												
	model	CINFOYN	-1.0146	?												
		CMVISSX	3.2595	?												
		CMNUMCHD	-0.7481	?												
		CMIMPNQD	1.2158	?												
		CDX	-2.5472	?												
AT52	Try	CONST	-10.6858	?					AT34	205.751	202.802	2.949	1	0.914	0.99	Reject DACTIML * MVISSX in sparse model.
	D*X in sparse	CDACTIML	6.3555	?												
	model	CINFOYN	-0.9609	?												
		CMVISSX	3.4694	?												
		CDX	-2.6646	?												
AT53	Try	CONST	-4.4603	1.2106	-3.68	0.000	1.000	0.85	AT43	195.552	195.439	0.113	1	0.263	0.99	Reject INFOYN * MVISSX in full model.
	I*X in full	CDACTIML	2.3558	0.6284	3.75	0.000	1.000	0.85								
	model	CINFOYN	-2.0717	0.9548	-2.17	0.031	0.969	0.85								
		CMVISSX	-1.0372	0.3845	-2.70	0.007	0.993	0.85								
		CMNUMCHD	-0.7299	0.3015	-2.42	0.016	0.984	0.85								
		CMIMPNQD	1.1278	0.4216	2.68	0.008	0.992	0.85								
		CIX	0.7152	0.6404	1.12	0.265	0.735	0.85								
AT54	Try	CONST	-4.3124	1.3231	-3.26	0.001	0.999	0.85	AT34	205.751	205.472	0.279	1	0.403	0.99	Reject INFOYN * MVISSX in sparse model.
	I*X in sparse	CDACTIML	2.5282	0.7119	3.55	0.000	1.000	0.85								
	model	CINFOYN	-1.5763	0.9552	-1.65	0.100	0.900	0.85								
		CMVISSX	-0.9491	0.3847	-2.47	0.014	0.986	0.85								
		CIX	0.4395	0.6461	0.68	0.497	0.503	0.85								
AT55	Try	CONST	-5.3562	1.5335	-3.49	0.001	0.999	0.85	AT43	195.552	195.527	0.025	1	0.126	0.99	Reject DACTIML * MNUMCHD1 in full model.
	D*C in full	CDACTIML	2.7145	0.8551	3.17	0.002	0.998	0.85								
	model	CINFOYN	-1.1611	0.3272	-3.55	0.000	1.000	0.85								
		CMVISSX	-0.8363	0.3125	-2.68	0.008	0.992	0.85								
		CMNUMCHD	-0.3306	2.2770	-0.15	0.885	0.115	0.85								
		CMIMPNQD	1.2140	0.4374	2.78	0.006	0.994	0.85								
		CDC	-0.2636	1.3941	-0.19	0.850	0.150	0.85								
AT56	Try	CONST	-4.7661	1.5331	-3.11	0.002	0.998	0.85	AT38	201.629	201.533	0.096	1	0.243	0.99	Reject DACTIML * MNUMCHD1 in sparse model.
	D*C in sparse	CDACTIML	2.8890	0.8962	3.22	0.001	0.999	0.85								
	model	CINFOYN	-1.0269	0.3204	-3.20	0.001	0.999	0.85								
		CMVISSX	-0.7790	0.3115	-2.50	0.013	0.987	0.85								
		CMNUMCHD	0.0533	2.2948	0.02	0.981	0.019	0.85								
		CDC	-0.5051	1.4130	-0.36	0.721	0.279	0.85								
AT57	Try	CONST	-5.2365	1.3512	-3.88	0.000	1.000	0.85	AT43	195.552	194.892	0.660	1	0.583	0.99	Reject INFOYN * MNUMCHD1 in full model.
	I*C in full	CDACTIML	2.5211	0.7089	3.56	0.000	1.000	0.85								
	model	CINFOYN	-0.8659	0.3828	-2.26	0.024	0.976	0.85								
		CMVISSX	-0.7824	0.3092	-2.53	0.012	0.988	0.85								
		CMNUMCHD	-0.5412	0.3522	-1.54	0.125	0.875	0.85								
		CMIMPNQD	1.2246	0.4405	2.78	0.006	0.994	0.85								
		CIC	-0.7360	0.7301	-1.01	0.314	0.686	0.85								
AT58	Try	CONST	-4.5192	1.3156	-3.44	0.001	0.999	0.85	AT38	201.629	200.923	0.706	1	0.599	0.99	Reject INFOYN * MNUMCHD1 in sparse model.
	I*C in sparse	CDACTIML	2.6615	0.7380	3.61	0.000	1.000	0.85								
	model	CINFOYN	-0.8191	0.3822	-2.14	0.033	0.967	0.85								
		CMVISSX	-0.7485	0.3112	-2.41	0.017	0.983	0.85								
		CMNUMCHD	-0.5694	0.3515	-1.62	0.106	0.894	0.85								
		CIC	-0.7544	0.7356	-1.03	0.306	0.694	0.85								
AT59	Try	CONST	-5.3151	1.4445	-3.68	0.000	1.000	0.85	AT43	195.552	195.477	0.075	1	0.216	0.99	Reject MVISSX * MNUMCHD1 in full model.
	X*C in full	CDACTIML	2.5483	0.7240	3.52	0.000	1.000	0.85								
	model	CINFOYN	-1.0894	0.3245	-3.36	0.001	0.999	0.85								
		CMVISSX	-0.6994	0.3919	-1.78	0.075	0.925	0.85								
		CMNUMCHD	-0.4315	0.8979	-0.48	0.631	0.369	0.85								
		CMIMPNQD	1.2302	0.4434	2.77	0.006	0.994	0.85								
		CXC	-0.2233	0.6369	-0.35	0.726	0.274	0.85								
AT60	Try	CONST	-4.5608	1.3609	-3.35	0.001	0.999	0.85	AT38	201.629	201.566	0.063	1	0.198	0.99	Reject MVISSX * MNUMCHD1 in sparse model.
	X*C in sparse	CDACTIML	2.6788	0.7368	3.64	0.000	1.000	0.85								
	model	CINFOYN	-1.0455	0.3237	-3.23	0.001	0.999	0.85								
		CMVISSX	-0.6775	0.3942	-1.72	0.087	0.913	0.85								
		CMNUMCHD	-0.4903	0.9000	-0.54	0.586	0.414	0.85								
		CXC	-0.2025	0.6387	-0.32	0.751	0.249	0.85								

Annoyance vs. Time (log percent) **3 - 18 February 1998**

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		Individual coefficients and their statistics							The entire model and its statistics							
			From Statistica				Calculated	Criterion	Reference		From Statistica	Calculated			Criterion	
Model	Purpose	Param	Value	Std. Err.	Stud. t	p	1 - p	1 - p	Model	- 2LogLike	- 2LogLike	G	Del df	1 - p	1 - p	Conclusions about this model
AT61	Try	CONST	-8.8348	?					AT43	195.552	194.880	0.672	1	0.588	0.99	Reject DACTIML * MIMPNQDV.
	D*Q	CDACTIML	4.7782	?												
		CINFOYN	-1.0848	?												
		CMVISSX	-0.7932	?												
		CMNUMCHD	-0.7339	?												
		CMIMPNQD	5.2098	?												
		CDQ	-2.4377	?												
AT62	Try	CONST	-4.8698	1.1984	-4.06	0.000	1.000	0.85	AT43	195.552	193.397	2.155	1	0.858	0.99	Reject INFOYN * MIMPNQDV.
	I*Q	CDACTIML	2.5211	0.6409	3.93	0.000	1.000	0.85								
		CINFOYN	-4.6485	4.4280	-1.05	0.295	0.705	0.85								
		CMVISSX	-0.8004	0.3070	-2.61	0.010	0.990	0.85								
		CMNUMCHD	-0.7083	0.3002	-2.36	0.019	0.981	0.85								
		CMIMPNQD	0.9191	0.4564	2.01	0.045	0.955	0.85								
		CIQ	3.6719	4.3110	0.85	0.395	0.605	0.85								
AT63	Try	CONST	-1.3963	?					AT43	195.552	192.796	2.756	1	0.903	0.99	Reject MVISSX * MIMPNQDV.
	X*Q	CDACTIML	2.6473	?												
		CINFOYN	-1.0698	?												
		CMVISSX	-4.3711	?												
		CMNUMCHD	-0.7228	?												
		CMIMPNQD	-3.0277	?												
		CXQ	3.7922	?												
AT64	Try	CONST	-4.6822	1.2052	-3.89	0.000	1.000	0.85	AT43	195.552	191.141	4.411	1	0.964	0.99	Reject MNUMCHD1 * MIMPNQDV.
	C*Q	CDACTIML	2.5863	0.6612	3.91	0.000	1.000	0.85								
		CINFOYN	-1.0657	0.3155	-3.38	0.001	0.999	0.85								
		CMVISSX	-0.7865	0.3060	-2.57	0.011	0.989	0.85								
		CMNUMCHD	-5.4244	5.8297	-0.93	0.353	0.647	0.85								
		CMIMPNQD	0.5385	0.4612	1.17	0.244	0.756	0.85								
		CCQ	4.9510	5.6347	0.88	0.380	0.620	0.85								
AT65	Try	CONST	-4.8314	2.7709	-1.74	0.082	0.918	0.85	AT43	195.552	193.220	2.332	9	0.015	0.99	Reject Specific Day.
	Specific day	CDACTIML	1.9938	0.6348	3.14	0.002	0.998	0.85								
		CINFOYN	-1.2676	0.3408	-3.72	0.000	1.000	0.85								
		CMVISSX	-0.9900	0.3250	-3.05	0.003	0.997	0.85								
		CMNUMCHD	-0.8351	0.3203	-2.61	0.010	0.990	0.85								
		CMIMPNQD	1.4245	0.4585	3.11	0.002	0.998	0.85								
		C15	1.1531	2.3746	0.49	0.628	0.372	0.85								
		C16	1.4527	2.3860	0.61	0.543	0.457	0.85								
		C17	-0.1497	2.3864	-0.06	0.950	0.050	0.85								
		C18	0.7507	2.4275	0.31	0.757	0.243	0.85								
		C21	0.6015	2.3747	0.25	0.800	0.200	0.85								
		C22	1.1753	2.3687	0.50	0.620	0.380	0.85								
		C23	0.2959	2.3784	0.12	0.901	0.099	0.85								
		C24	0.8598	2.3715	0.36	0.717	0.283	0.85								
		C25	0.1853	2.4076	0.08	0.939	0.061	0.85								
AT66	Try	CONST	-5.4036	1.3643	-3.96	0.000	1.000	0.85	AT43	195.552	193.966	1.586	1	0.792	0.99	Reject DSLLEQ.
	DSLLEQ	CDACTIML	2.1270	0.7483	2.84	0.005	0.995	0.85								
		CINFOYN	-1.0937	0.3243	-3.37	0.001	0.999	0.85								
		CMVISSX	-0.8190	0.3137	-2.61	0.009	0.991	0.85								
		CMNUMCHD	-0.6822	0.3074	-2.22	0.027	0.973	0.85								
		CMIMPNQD	1.2103	0.4450	2.72	0.007	0.993	0.85								
		CDSLLEQ	0.0165	0.0130	1.26	0.207	0.793	0.85								
AT67	Try	CONST	-4.7074	?					AT43	195.552	194.570	0.982	1	0.678	0.99	Reject Visitor (continuous variable).
	MVISAG	CDACTIML	2.4817	?												
	(continuous	CINFOYN	-1.0650	?												
	variable)	CMVISSX	-0.7536	?												
		CMNUMCHD	-0.6860	?												
		CMIMPNQD	1.2013	?												
		CMVISAG	-0.0114	?												
AT68	HDT14 <> 1	CONST	-5.0902	1.2274	-4.15	0.000	1.000	0.85			186.315					Use coefficient values for confidence limits.
		CDACTIML	2.4779	0.6504	3.81	0.000	1.000	0.85								
		CMVISSX	-0.8104	0.3121	-2.60	0.010	0.990	0.85								
		CINFOYN	-1.2650	0.3342	-3.78	0.000	1.000	0.85								
		CMNUMCHD	-0.6591	0.3021	-2.18	0.030	0.970	0.85								
		CMIMPNQD	1.2289	0.4375	2.81	0.005	0.995	0.85								

		Individual coefficients and their statistics							The entire model and its statistics							
			From Statistica				Calculated	Criterion	Reference		From Statistica	Calculated			Criterion	
Model	Purpose	Param	Value	Std. Err.	Stud. t	p	1 - p	1 - p	Model	- 2LogLike	- 2LogLike	G	Del df	1 - p	1 - p	Conclusions about this model
AT69	HDT15 <> 1	CONST	-4.7259	1.1965	-3.95	0.000	1.000	0.85			177.113					Use coefficient values for confidence limits.
		CDACTIML	2.3278	0.6415	3.63	0.000	1.000	0.85								
		CMVISSX	-0.7891	0.3229	-2.44	0.015	0.985	0.85								
		CINFOYN	-0.9117	0.3339	-2.73	0.007	0.993	0.85								
		CMNUMCHD	-0.8932	0.3265	-2.74	0.007	0.993	0.85								
		CMIMPNQD	1.0762	0.4408	2.44	0.015	0.985	0.85								
AT70	HDT16 <> 1	CONST	-5.8580	1.3072	-4.48	0.000	1.000	0.85			172.928					Use coefficient values for confidence limits.
		CDACTIML	2.3148	0.6550	3.53	0.000	1.000	0.85								
		CMVISSX	-0.4627	0.3147	-1.47	0.143	0.857	0.85								
		CINFOYN	-0.9477	0.3325	-2.85	0.005	0.995	0.85								
		CMNUMCHD	-0.5256	0.3138	-1.67	0.095	0.905	0.85								
		CMIMPNQD	1.6623	0.5757	2.89	0.004	0.996	0.85								
AT71	HDT17 <> 1	CONST	-4.6935	1.2122	-3.87	0.000	1.000	0.85			170.720					Use coefficient values for confidence limits.
		CDACTIML	2.5615	0.6527	3.92	0.000	1.000	0.85								
		CMVISSX	-1.0314	0.3331	-3.10	0.002	0.998	0.85								
		CINFOYN	-1.2134	0.3399	-3.57	0.000	1.000	0.85								
		CMNUMCHD	-0.8908	0.3255	-2.74	0.007	0.993	0.85								
		CMIMPNQD	1.2197	0.4509	2.70	0.007	0.993	0.85								
AT72	HDT18 <> 1	CONST	-6.2996	1.4828	-4.25	0.000	1.000	0.85			179.408					Use coefficient values for confidence limits.
		CDACTIML	3.0741	0.7841	3.92	0.000	1.000	0.85								
		CMVISSX	-0.8223	0.3191	-2.58	0.010	0.990	0.85								
		CINFOYN	-1.0634	0.3259	-3.26	0.001	0.999	0.85								
		CMNUMCHD	-0.6589	0.3106	-2.12	0.035	0.965	0.85								
		CMIMPNQD	1.5113	0.4967	3.04	0.003	0.997	0.85								
AT73	HDT21 <> 1	CONST	-4.0173	1.1612	-3.46	0.001	0.999	0.85			173.242					Use coefficient values for confidence limits.
		CDACTIML	1.8723	0.6214	3.01	0.003	0.997	0.85								
		CMVISSX	-0.7087	0.3308	-2.14	0.033	0.967	0.85								
		CINFOYN	-1.0528	0.3404	-3.09	0.002	0.998	0.85								
		CMNUMCHD	-0.9737	0.3302	-2.95	0.003	0.997	0.85								
		CMIMPNQD	1.1297	0.4469	2.53	0.012	0.988	0.85								
AT74	HDT22 <> 1	CONST	-5.7773	1.4317	-4.04	0.000	1.000	0.85			161.920					Use coefficient values for confidence limits.
		CDACTIML	2.8449	0.7492	3.80	0.000	1.000	0.85								
		CMVISSX	-0.9110	0.3480	-2.62	0.009	0.991	0.85								
		CINFOYN	-1.1077	0.3541	-3.13	0.002	0.998	0.85								
		CMNUMCHD	-0.4305	0.3262	-1.32	0.188	0.812	0.85								
		CMIMPNQD	1.3300	0.5039	2.64	0.009	0.991	0.85								
AT75	HDT23 <> 1	CONST	-4.7302	1.2017	-3.94	0.000	1.000	0.85			177.957					Use coefficient values for confidence limits.
		CDACTIML	2.3358	0.6480	3.60	0.000	1.000	0.85								
		CMVISSX	-0.8560	0.3236	-2.65	0.009	0.991	0.85								
		CINFOYN	-1.0213	0.3307	-3.09	0.002	0.998	0.85								
		CMNUMCHD	-0.7035	0.3166	-2.22	0.027	0.973	0.85								
		CMIMPNQD	1.2152	0.4474	2.72	0.007	0.993	0.85								
AT76	HDT24 <> 1	CONST	-6.1918	1.4593	-4.24	0.000	1.000	0.85			169.704					Use coefficient values for confidence limits.
		CDACTIML	3.1571	0.7941	3.98	0.000	1.000	0.85								
		CMVISSX	-0.6576	0.3264	-2.01	0.045	0.955	0.85								
		CINFOYN	-1.1627	0.3491	-3.33	0.001	0.999	0.85								
		CMNUMCHD	-0.8509	0.3290	-2.59	0.010	0.990	0.85								
		CMIMPNQD	1.1125	0.4483	2.48	0.014	0.986	0.85								
AT77	HDT25 <> 1	CONST	-5.2189	1.3189	-3.96	0.000	1.000	0.85			183.992					Use coefficient values for confidence limits.
		CDACTIML	2.5732	0.7148	3.60	0.000	1.000	0.85								
		CMVISSX	-0.7040	0.3211	-2.19	0.029	0.971	0.85								
		CINFOYN	-1.1253	0.3325	-3.38	0.001	0.999	0.85								
		CMNUMCHD	-0.6971	0.3195	-2.18	0.030	0.970	0.85								
		CMIMPNQD	1.1434	0.4468	2.56	0.011	0.989	0.85								

Model	Purpose	Param	Individual coefficients and their statistics: From Statistica Value	Std. Err.	Stud. t	p	Calculated 1 - p	Criterion 1 - p	The entire model and its statistics: Reference Model	Reference -2LogLike	From Statistica -2LogLike	Calculated G	Del df	1 - p	Criterion 1 - p	Conclusions about this model
IT1	Null	CONST	-1.0640	0.1359	-7.71	0.000	1.000	0.85	----------	----------	379.238	----------	----------	----------	----------	This is the "null" model, using only the constant in the regression.
IT2	Try DACTIML	CONST	-2.4576	0.7234	-3.40	0.001	0.999	0.85	IT1	379.238	372.393	6.845	1	0.991	0.90	Accept DACTIML.
		CDACTIML	0.9518	0.4471	2.13	0.034	0.966	0.85								
IT3	Try OHNOST and OHSOMEST	CONST	-2.7630	0.7876	-3.51	0.001	0.999	0.85	IT2	372.393	359.665	12.728	2	0.998	0.90	Reject OHNOST, OHSOMEST.
		CDACTIML	0.3837	0.4695	0.82	0.414	0.586	0.85								
		COHNOST	1.5004	0.4922	3.05	0.002	0.998	0.85								
		COHSOMES	1.2545	0.4930	2.54	0.011	0.989	0.85								
IT4	Try OVERHD	CONST	-2.7541	0.7891	-3.49	0.001	0.999	0.85	IT2	372.393	360.482	11.911	1	0.999	0.90	Reject OVERHD.
		CDACTIML	0.3763	0.4678	0.80	0.422	0.578	0.85								
		COVERHD	1.3804	0.4720	2.92	0.004	0.996	0.85								
IT5	Try Top	TOP	19.6358	99,111.6931	0.00	1.000	0.000	0.85	IT2	372.393	372.393	0.000	1	0.000	0.90	Reject Top at this stage in the analysis. Because Top was never significant or stable, and is so unnecessary here, do not test again until after the final model.
		CONST	-2.4576	0.7236	-3.40	0.001	0.999	0.85								
		CDACTIML	0.9518	0.4474	2.13	0.034	0.966	0.85								
IT6	Try INFONPS and INFOOTH	CONST	-2.4246	0.7306	-3.32	0.001	0.999	0.85	IT2	372.393	372.244	0.149	2	0.072	0.90	Reject INFONPS, INFOOTH.
		CDACTIML	0.9512	0.4471	2.13	0.034	0.966	0.85								
		CINFONPS	-0.1286	0.3590	-0.36	0.720	0.280	0.85								
		CINFOOTH	-0.0256	0.3206	-0.08	0.936	0.064	0.85								
IT7	Try INFOYN	CONST	-2.4312	0.7320	-3.32	0.001	0.999	0.85	IT2	372.393	372.318	0.075	1	0.216	0.90	Reject INFOYN.
		CDACTIML	0.9555	0.4479	2.13	0.034	0.966	0.85								
		CINFOYN	-0.0696	0.2710	-0.26	0.798	0.202	0.85								
IT8	Try SIGN	CONST	-2.4341	0.7235	-3.36	0.001	0.999	0.85	IT2	372.393	372.247	0.146	1	0.298	0.90	Reject SIGN.
		CDACTIML	0.9690	0.4487	2.16	0.032	0.968	0.85								
		CSIGN	-0.0972	0.2718	-0.36	0.721	0.279	0.85								
IT9	Try DACTIML, filtered by MDISCLS	CONST	-1.3891	0.9339	-1.49	0.138	0.862	0.85	IT1	379.238	313.568	65.670	1	1.000	0.90	Not good, but use as baseline for next case.
		CDACTIML	0.3862	0.5774	0.67	0.504	0.496	0.85								
IT10	Try MDISCLS	CONST	-0.2307	1.0049	-0.23	0.819	0.181	0.85	IT9	313.568	312.318	1.250	1	0.736	0.90	Reject MDISCLS. Improvement is not significant compared to IT9, the basecase with comparable filtering. Any improvement caused by MDISCLS over an unfiltered DACTIML (IT2) would be due to exclusion of cases, as before with RANNOYDM.
		CDACTIML	0.0158	0.5733	0.03	0.978	0.022	0.85								
		CMDISCLS	-0.0001	0.0000	-1.70	0.090	0.910	0.85								
IT11	Try MSELCLS	CONST	-2.3277	1.6807	-1.38	0.167	0.833	0.85	IT9	313.568	312.837	0.731	1	0.607	0.90	Reject MSELCLS, as well, for same reasons.
		CDACTIML	0.3231	0.5753	0.56	0.575	0.425	0.85								
		CMSELCLS	0.0119	0.0165	0.72	0.472	0.528	0.85								
IT12	Try DSLLEQ	CONST	-3.3709	0.8856	-3.81	0.000	1.000	0.85	IT2	372.393	353.559	18.834	1	1.000	0.90	Reject DSLLEQ.
		CDACTIML	0.2432	0.5326	0.46	0.648	0.352	0.85								
		CDSLLEQ	0.0365	0.0123	2.96	0.003	0.997	0.85								
IT13	Try MVISSX	CONST	-1.4113	0.7896	-1.79	0.075	0.925	0.85	IT2	372.393	364.013	8.380	1	0.996	0.90	Accept MVISSX.
		CDACTIML	0.9417	0.4400	2.14	0.033	0.967	0.85								
		CMVISSX	-0.7154	0.2834	-2.52	0.012	0.988	0.85								
IT14	Try MVISAG30, MVISAG40, MVISAG50	CONST	-0.8339	0.7796	-1.07	0.286	0.714	0.85	IT13	364.013	351.405	12.608	3	0.994	0.90	Tentatively accept Visitor age in decades, but try two alternatives as next two cases.
		CDACTIML	0.8976	0.4246	2.11	0.035	0.965	0.85								
		CMVISSX	-0.6681	0.2836	-2.36	0.019	0.981	0.85								
		CMVISAG3	-1.1105	0.4017	-2.76	0.006	0.994	0.85								
		CMVISAG4	-0.9752	0.3825	-2.55	0.011	0.989	0.85								
		CMVISAG5	-0.6919	0.3529	-1.96	0.051	0.949	0.85								
IT15	Try MVISAGC	CONST	-0.8080	0.8168	-0.99	0.323	0.677	0.85	IT13	364.013	358.766	5.247	1	0.978	0.90	Categorized visitor age almost as good, but variable not intuitive. So this doesn't supplant the three variables: MVISAG30, 40 and 50. Next test age as a continuous variable.
		CDACTIML	0.9100	0.4319	2.11	0.036	0.964	0.85								
		CMVISSX	-0.6914	0.2842	-2.43	0.016	0.984	0.85								
		CMVISAGC	-0.2553	0.1197	-2.13	0.034	0.966	0.85								
IT16	Try MVISAG	CONST	-0.8605	0.8780	-0.98	0.328	0.672	0.85	IT13	364.013	348.547	15.466	1	1.000	0.90	Accept MVISAG (continuous age variable) instead of MVISAG30, 40 and 50 (age in decades).
		CDACTIML	1.1481	0.4634	2.48	0.014	0.986	0.85								
		CMVISSX	-0.6913	0.2859	-2.42	0.016	0.984	0.85								
		CMVISAG	-0.0245	0.0101	-2.43	0.015	0.985	0.85								

		Individual coefficients and their statistics							The entire model and its statistics							
			From Statistica				Calculated	Criterion	Reference		From Statistica	Calculated			Criterion	
Model	Purpose	Param	Value	Std. Err.	Stud. t	p	1 - p	1 - p	Model	- 2LogLike	- 2LogLike	G	Del df	1 - p	1 - p	Conclusions about this model
IT17	Try	CONST	-0.7542	1.0260	-0.74	0.463	0.537	0.85	IT16	348.547	348.503	0.044	1	0.166	0.90	Reject MFRST.
	MFRST	CDACTIML	1.1381	0.4659	2.44	0.015	0.985	0.85								
		CMVISSX	-0.6904	0.2868	-2.41	0.017	0.983	0.85								
		CMVISAG	-0.0246	0.0101	-2.44	0.015	0.985	0.85								
		CMFRST	-0.0965	0.4796	-0.20	0.841	0.159	0.85								
IT18	Try	CONST	-0.7877	0.8705	-0.90	0.366	0.634	0.85	IT16	348.547	336.683	11.864	1	0.999	0.90	Accept MNUMCHD1.
	MNUMCHD1	CDACTIML	1.2450	0.4651	2.68	0.008	0.992	0.85								
		CMVISSX	-0.6396	0.2850	-2.24	0.026	0.974	0.85								
		CMVISAG	-0.0213	0.0097	-2.21	0.028	0.972	0.85								
		CMNUMCHD	-0.9342	0.2865	-3.26	0.001	0.999	0.85								
IT19	Try	CONST	-0.6338	0.8844	-0.72	0.474	0.526	0.85	IT18	336.683	335.382	1.301	1	0.746	0.90	Reject MNUMADD3.
	MNUMADD3	CDACTIML	1.2769	0.4668	2.74	0.007	0.993	0.85								
		CMVISSX	-0.6539	0.2858	-2.29	0.023	0.977	0.85								
		CMVISAG	-0.0235	0.0100	-2.35	0.020	0.980	0.85								
		CMNUMCHD	-0.8938	0.2883	-3.10	0.002	0.998	0.85								
		CNUMADD	-0.3305	0.2997	-1.10	0.271	0.729	0.85								
IT20	Try	CONST	-0.7520	0.8763	-0.86	0.391	0.609	0.85	IT18	336.683	336.570	0.113	1	0.263	0.90	Reject DACNUM.
	DACNUM	CDACTIML	1.1839	0.4986	2.37	0.018	0.982	0.85								
		CMVISSX	-0.6433	0.2856	-2.25	0.025	0.975	0.85								
		CMVISAG	-0.0212	0.0097	-2.19	0.029	0.971	0.85								
		CMNUMCHD	-0.9328	0.2869	-3.25	0.001	0.999	0.85								
		CDACNUM	0.0084	0.0252	0.33	0.739	0.261	0.85								
IT21	Try	CONST	-0.2037	1.1299	-0.18	0.857	0.143	0.85	IT18	336.683	336.020	0.663	1	0.584	0.90	Reject HVISTM.
	HVISTM	CDACTIML	1.1221	0.4826	2.32	0.021	0.979	0.85								
		CMVISSX	-0.6548	0.2869	-2.28	0.023	0.977	0.85								
		CMVISAG	-0.0226	0.0098	-2.30	0.022	0.978	0.85								
		CMNUMCHD	-0.9238	0.2869	-3.22	0.001	0.999	0.85								
		CHVISTM	-0.2469	0.3126	-0.79	0.430	0.570	0.85								
IT22	Try	CONST	-1.1882	0.9352	-1.27	0.205	0.795	0.85	IT18	336.683	332.645	4.038	1	0.956	0.90	Accept MIMPNQDV.
	MIMPNQDV	CDACTIML	1.2050	0.4909	2.45	0.015	0.985	0.85								
		CMVISSX	-0.6720	0.2916	-2.30	0.022	0.978	0.85								
		CMVISAG	-0.0212	0.0098	-2.16	0.031	0.969	0.85								
		CMNUMCHD	-0.9138	0.2924	-3.13	0.002	0.998	0.85								
		CMIMPNQD	0.6464	0.3401	1.90	0.058	0.942	0.85								
IT23	Try	CONST	-1.9297	1.0861	-1.78	0.077	0.923	0.85	IT22	332.645	330.157	2.488	1	0.885	0.90	Reject MIMPSCDV, even though close.
	MIMPSCDV	CDACTIML	1.1724	0.4647	2.52	0.012	0.988	0.85								
		CMVISSX	-0.6772	0.2849	-2.38	0.018	0.982	0.85								
		CMVISAG	-0.0212	0.0097	-2.19	0.029	0.971	0.85								
		CMNUMCHD	-0.8646	0.2878	-3.00	0.003	0.997	0.85								
		CMIMPNQD	0.5399	0.3444	1.57	0.118	0.882	0.85								
		CMIMPSCD	0.9250	0.6567	1.41	0.160	0.840	0.85								
IT24	Try	CONST	-1.1838	0.9008	-1.31	0.190	0.810	0.85	IT22	332.645	332.628	0.017	1	0.104	0.90	Reject MIMPHCDV.
	MIMPHCDV	CDACTIML	1.2060	0.4612	2.61	0.009	0.991	0.85								
		CMVISSX	-0.6656	0.2904	-2.29	0.023	0.977	0.85								
		CMVISAG	-0.0210	0.0097	-2.16	0.031	0.969	0.85								
		CMNUMCHD	-0.9126	0.2875	-3.17	0.002	0.998	0.85								
		CMIMPNQD	0.6519	0.3417	1.91	0.057	0.943	0.85								
		CMIMPHCD	-0.0386	0.2980	-0.13	0.897	0.103	0.85								

			Individual coefficients and their statistics						The entire model and its statistics							
			From Statistica				Calculated	Criterion	Reference		From Statistica	Calculated			Criterion	
Model	Purpose	Param	Value	Std. Err.	Stud. t	p	1 - p	1 - p	Model	- 2LogLike	- 2LogLike	G	Del df	1 - p	1 - p	Conclusions about this model
IT25	Try	CONST	-2.3841	1.1077	-2.15	0.032	0.968	0.85	IT22	332.645	322.554	10.091	1	0.999	0.90	Reject DSLMAX.
	DSLMAX	CDACTIML	0.5195	0.5121	1.01	0.311	0.689	0.85								
		CMVISSX	-0.6893	0.2877	-2.40	0.017	0.983	0.85								
		CMVISAG	-0.0220	0.0097	-2.27	0.024	0.976	0.85								
		CMNUMCHD	-0.8427	0.2880	-2.93	0.004	0.996	0.85								
		CMIMPNQD	0.6092	0.3440	1.77	0.078	0.922	0.85								
		CDSLMAX	0.0307	0.0110	2.80	0.005	0.995	0.85								
IT26	Try	CONST	-1.5780	1.0088	-1.56	0.119	0.881	0.85	IT22	332.645	326.466	6.179	3	0.897	0.90	Reject Specific interviewer.
	Specific	CDACTIML	1.2197	0.4780	2.55	0.011	0.989	0.85								
	interviewer	CMVISSX	-0.5845	0.2881	-2.03	0.043	0.957	0.85								
		CMVISAG	-0.0196	0.0100	-1.96	0.051	0.949	0.85								
		CMNUMCHD	-0.9080	0.2897	-3.13	0.002	0.998	0.85								
		CMIMPNQD	0.6549	0.3422	1.91	0.057	0.943	0.85								
		CHINT2	-0.1232	0.4435	-0.28	0.781	0.219	0.85								
		CHINT3	0.5737	0.3357	1.71	0.088	0.912	0.85								
		CHINT4	-0.3269	0.5166	-0.63	0.527	0.473	0.85								
IT27	Try	CONST	-0.4784	1.6167	-0.30	0.767	0.233	0.85	IT22	332.645	325.815	6.830	9	0.345	0.90	Reject Specific date.
	Specific date	CDACTIML	0.8534	0.4480	1.90	0.058	0.942	0.85								
		CMVISSX	-0.9494	0.2972	-3.20	0.002	0.998	0.85								
		CMVISAG	-0.0272	0.0105	-2.58	0.010	0.990	0.85								
		CMNUMCHD	-0.8550	0.2978	-2.87	0.004	0.996	0.85								
		CMIMPNQD	0.7705	0.3522	2.19	0.029	0.971	0.85								
		C15	-0.0193	1.4232	-0.01	0.989	0.011	0.85								
		C16	0.8230	1.4085	0.58	0.559	0.441	0.85								
		C17	-0.7880	1.4425	-0.55	0.585	0.415	0.85								
		C18	0.2485	1.4701	0.17	0.866	0.134	0.85								
		C21	0.3824	1.3975	0.27	0.785	0.215	0.85								
		C22	0.5801	1.3810	0.42	0.675	0.325	0.85								
		C23	0.4649	1.4092	0.33	0.742	0.258	0.85								
		C24	0.7542	1.4021	0.54	0.591	0.409	0.85								
		C25	0.4652	1.4284	0.33	0.745	0.255	0.85								
IT28	Try	TOP	2.9435	?					IT22	332.645	332.640	0.005	1	0.056	0.90	Reject Top.
	Top	CONST	-1.1184	?												
		CDACTIML	1.2406	?												
		CMVISSX	-0.6906	?												
		CMVISAG	-0.0218	?												
		CMNUMCHD	-0.9363	?												
		CMIMPNQD	0.6624	?												
IT29	HDT14 <> 1	CONST	-1.0901	0.8879	-1.23	0.220	0.780	0.85			326.449					Use coefficient values for confidence limits.
		CDACTIML	1.1306	0.4498	2.51	0.012	0.988	0.85								
		CMVISSX	-0.7317	0.2863	-2.56	0.011	0.989	0.85								
		CMVISAG	-0.0185	0.0096	-1.93	0.055	0.945	0.85								
		CMNUMCHD	-0.9259	0.2867	-3.23	0.001	0.999	0.85								
		CMIMPNQD	0.6109	0.3374	1.81	0.071	0.929	0.85								
IT30	HDT15 <> 1	CONST	0.3904	0.8665	0.45	0.653	0.347	0.85			307.831					Use coefficient values for confidence limits.
		CDACTIML	0.5188	0.4156	1.25	0.213	0.787	0.85								
		CMVISSX	-0.8105	0.2998	-2.70	0.007	0.993	0.85								
		CMVISAG	-0.0265	0.0102	-2.59	0.010	0.990	0.85								
		CMNUMCHD	-0.9836	0.3027	-3.25	0.001	0.999	0.85								
		CMIMPNQD	0.5407	0.3488	1.55	0.122	0.878	0.85								
IT31	HDT16 <> 1	CONST	-1.6425	0.9627	-1.71	0.089	0.911	0.85			296.703					Use coefficient values for confidence limits.
		CDACTIML	1.3576	0.4905	2.77	0.006	0.994	0.85								
		CMVISSX	-0.6415	0.2976	-2.16	0.032	0.968	0.85								
		CMVISAG	-0.0176	0.0098	-1.79	0.075	0.925	0.85								
		CMNUMCHD	-0.8785	0.2980	-2.95	0.003	0.997	0.85								
		CMIMPNQD	0.6216	0.3653	1.70	0.090	0.910	0.85								
IT32	HDT17 <> 1	CONST	0.1223	0.9093	0.13	0.893	0.107	0.85			298.141					Use coefficient values for confidence limits.
		CDACTIML	0.9373	0.4446	2.11	0.036	0.964	0.85								
		CMVISSX	-0.8378	0.3023	-2.77	0.006	0.994	0.85								
		CMVISAG	-0.0282	0.0105	-2.68	0.008	0.992	0.85								
		CMNUMCHD	-1.0313	0.3035	-3.40	0.001	0.999	0.85								
		CMIMPNQD	0.4170	0.3473	1.20	0.231	0.769	0.85								

Interference with Natural Quiet vs. Time (log percent) **11-18 February 1998**

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		Individual coefficients and their statistics							The entire model and its statistics							
			From Statistica				Calculated	Criterion	Reference		From Statistica	Calculated			Criterion	
Model	Purpose	Param	Value	Std. Err.	Stud. t	p	1 - p	1 - p	Model	- 2LogLike	- 2LogLike	G	Del df	1 - p	1 - p	Conclusions about this model
IT33	HDT18 <> 1	CONST	-1.2317	0.9323	-1.32	0.187	0.813	0.85			314.698					Use coefficient values for confidence limits.
		CDACTIML	1.2467	0.4858	2.57	0.011	0.989	0.85								
		CMVISSX	-0.7160	0.2936	-2.44	0.015	0.985	0.85								
		CMVISAG	-0.0215	0.0099	-2.18	0.030	0.970	0.85								
		CMNUMCHD	-0.8161	0.2929	-2.79	0.006	0.994	0.85								
		CMIMPNQD	0.6773	0.3494	1.94	0.053	0.947	0.85								
IT34	HDT21 <> 1	CONST	-1.3126	0.9812	-1.34	0.182	0.818	0.85			280.868					Use coefficient values for confidence limits.
		CDACTIML	1.2313	0.4955	2.49	0.014	0.986	0.85								
		CMVISSX	-0.5770	0.3058	-1.89	0.060	0.940	0.85								
		CMVISAG	-0.0229	0.0109	-2.10	0.037	0.963	0.85								
		CMNUMCHD	-1.0166	0.3096	-3.28	0.001	0.999	0.85								
		CMIMPNQD	0.7316	0.3652	2.00	0.046	0.954	0.85								
IT35	HDT22 <> 1	CONST	-1.5626	1.0237	-1.53	0.128	0.872	0.85			272.507					Use coefficient values for confidence limits.
		CDACTIML	1.4724	0.5083	2.90	0.004	0.996	0.85								
		CMVISSX	-0.7041	0.3106	-2.27	0.024	0.976	0.85								
		CMVISAG	-0.0243	0.0105	-2.31	0.022	0.978	0.85								
		CMNUMCHD	-0.8000	0.3131	-2.56	0.011	0.989	0.85								
		CMIMPNQD	0.7087	0.3814	1.86	0.064	0.936	0.85								
IT36	HDT23 <> 1	CONST	-0.8990	0.9091	-0.99	0.324	0.676	0.85			302.333					Use coefficient values for confidence limits.
		CDACTIML	1.0513	0.4570	2.30	0.022	0.978	0.85								
		CMVISSX	-0.6824	0.2966	-2.30	0.022	0.978	0.85								
		CMVISAG	-0.0218	0.0099	-2.20	0.028	0.972	0.85								
		CMNUMCHD	-0.9118	0.2972	-3.07	0.002	0.998	0.85								
		CMIMPNQD	0.6397	0.3528	1.81	0.071	0.929	0.85								
IT37	HDT24 <> 1	CONST	-1.1805	0.9479	-1.25	0.214	0.786	0.85			293.024					Use coefficient values for confidence limits.
		CDACTIML	1.2103	0.4912	2.46	0.014	0.986	0.85								
		CMVISSX	-0.5851	0.3045	-1.92	0.056	0.944	0.85								
		CMVISAG	-0.0268	0.0106	-2.52	0.012	0.988	0.85								
		CMNUMCHD	-0.7970	0.3060	-2.60	0.010	0.990	0.85								
		CMIMPNQD	0.6306	0.3573	1.77	0.079	0.921	0.85								
IT38	HDT25 <> 1	CONST	0.1918	0.9349	0.21	0.838	0.162	0.85			303.578					Use coefficient values for confidence limits.
		CDACTIML	0.4900	0.4730	1.04	0.301	0.699	0.85								
		CMVISSX	-0.7929	0.3035	-2.61	0.009	0.991	0.85								
		CMVISAG	-0.0244	0.0103	-2.37	0.018	0.982	0.85								
		CMNUMCHD	-1.0016	0.3051	-3.28	0.001	0.999	0.85								
		CMIMPNQD	0.6516	0.3558	1.83	0.068	0.932	0.85								

Annoyance vs. Relative Sound Level (Aircraft Leq minus Background Leq)
294470.03 White Sands Regression History

19 Feb 98 - 10 Mar 98

			Individual coefficients and their statistics						The entire model and its statistics							
			From Statistica				Calculated	Criterion	Reference		From Statistica	Calculated			Criterion	
Model	Purpose	Param	Value	Std. Err.	Stud. t	p	1 - p	1 - p	Model	- 2LogLike	- 2LogLike	G	Del df	1 - p	1 - p	Conclusions about this model
AR1	Null	CONST	-2.0555	0.1523	-13.49	0.000	1.000	0.85	----------	----------	230.655	----------	----------	----------	----------	This is the "null" model, using only the constant in the regression.
AR2	Try DREBQQ	CONST	-3.2057	0.4765	-6.73	0.000	1.000	0.85	AR1	230.655	223.840	6.815	1	0.991	0.90	Accept DREBQQ.
		CDREBQQ	0.0314	0.0107	2.93	0.004	0.996	0.85								
AR3	Try Top	TOP	-1.3754	?					AR2	223.840	223.441	0.399	1	0.472	0.90	Reject Top at this stage in the analysis.
		CONST	-1.8534	?												
		CDREBQQ	0.0629	?												
AR4	Try OHNOST OHSOMEST	CONST	-3.3763	0.5623	-6.00	0.000	1.000	0.85	AR2	223.840	223.318	0.522	2	0.230	0.90	Reject OHNOST/OHSOMEST.
		CDREBQQ	0.0225	0.0150	1.50	0.135	0.865	0.85								
		COHNOST	0.5901	0.6853	0.86	0.390	0.610	0.85								
		COHSOMES	0.5670	0.7232	0.78	0.434	0.566	0.85								
AR5	Try OVERHD	CONST	-3.3737	0.5623	-6.00	0.000	1.000	0.85	AR2	223.840	223.322	0.518	1	0.528	0.90	Reject OVERHD.
		CDREBQQ	0.0223	0.0147	1.52	0.130	0.870	0.85								
		COVERHD	0.5848	0.6806	0.86	0.391	0.609	0.85								
AR6	Try INFONPS INFOOTH	CONST	-2.8153	0.4658	-6.04	0.000	1.000	0.85	AR2	223.840	217.232	6.608	2	0.963	0.90	Tentatively accept INFONPS/INFOOTH, but check the simpler INFOYN next, as well. Note that the two coefficients are not distinguishable.
		CDREBQQ	0.0307	0.0104	2.94	0.004	0.996	0.85								
		CINFONPS	-0.8694	0.4663	-2.12	0.035	0.965	0.85								
		CINFOOTH	-0.9390	0.3959	-2.37	0.018	0.982	0.85								
AR7	Try INFOYN	CONST	-2.8180	0.4648	-6.06	0.000	1.000	0.85	AR2	223.840	217.237	6.603	1	0.990	0.90	Accept INFOYN.
		CDREBQQ	0.0308	0.0104	2.95	0.003	0.997	0.85								
		CINFOYN	-0.9596	0.3247	-2.95	0.003	0.997	0.85								
AR8	Same, but exclude if MDISCLS missing	CONST	-2.3543	0.7420	-3.17	0.002	0.998	0.85	AR2	223.840	191.253	32.587	1	1.000	0.90	Baseline for next model.
		CDREBQQ	0.0214	0.0162	1.32	0.189	0.811	0.85								
		CINFOYN	-1.0360	0.3646	-2.84	0.005	0.995	0.85								
AR9	Try MDISCLS	CONST	?													Reject MDISCLS. Predictors too redundant for Statistica to complete the regression.
		CDREBQQ	?													
		CINFOYN	?													
		CMDISCLS	?													
AR10	Try MSELCLS	CONST	-2.0743	1.5854	-1.31	0.192	0.808	0.85	AR8	191.253	191.222	0.031	1	0.140	0.90	Reject MSELCLS. Improvement is not significant compared to AR8, the basecase with comparable filtering. Any improvement caused by MSELCLS over an unfiltered DREBQQ and INFOYN would be due to exclusion of cases.
		CDREBQQ	0.0247	0.0228	1.08	0.281	0.719	0.85								
		CINFOYN	-1.0398	0.3636	-2.86	0.005	0.995	0.85								
		CMSELCLS	-0.0047	0.0236	-0.20	0.841	0.159	0.85								
AR11	Try DACTIML	CONST	-5.6608	1.3971	-4.05	0.000	1.000	0.85	AR7	217.237	208.996	8.241	1	0.996	0.90	Reject DACTIML.
		CDREBQQ	0.0120	0.0118	1.02	0.309	0.691	0.85								
		CINFOYN	-1.0441	0.3277	-3.19	0.002	0.998	0.85								
		CDACTIML	2.2837	0.8433	2.71	0.007	0.993	0.85								
AR12	Try MVISSX	CONST	-1.6579	0.6225	-2.66	0.008	0.992	0.85	AR7	217.237	212.117	5.120	1	0.976	0.90	Accept MVISSX.
		CDREBQQ	0.0304	0.0106	2.87	0.004	0.996	0.85								
		CINFOYN	-0.9263	0.3228	-2.87	0.004	0.996	0.85								
		CMVISSX	-0.8276	0.3194	-2.59	0.010	0.990	0.85								
AR13	Try MVISAG	CONST	-1.0244	0.7131	-1.44	0.152	0.848	0.85	AR12	212.117	209.669	2.448	1	0.882	0.90	Reject MVISAG.
		CDREBQQ	0.0304	0.0106	2.86	0.004	0.996	0.85								
		CINFOYN	-0.9020	0.3237	-2.79	0.006	0.994	0.85								
		CMVISSX	-0.7936	0.3214	-2.47	0.014	0.986	0.85								
		CMVISAG	-0.0183	0.0106	-1.73	0.085	0.915	0.85								
AR14	Try MFRST	CONST	-1.6661	0.8020	-2.08	0.039	0.961	0.85	AR12	212.117	212.117	0.000	1	0.000	0.90	Reject MFRST.
		CDREBQQ	0.0304	0.0106	2.87	0.004	0.996	0.85								
		CINFOYN	-0.9259	0.3244	-2.85	0.005	0.995	0.85								
		CMVISSX	-0.8277	0.3215	-2.57	0.010	0.990	0.85								
		CMFRST	0.0089	0.5350	0.02	0.987	0.013	0.85								
AR15	Try MNUMCHD1	CONST	-1.3879	0.6344	-2.19	0.029	0.971	0.85	AR12	212.117	209.969	2.148	1	0.857	0.90	Accept MNUMCHD1, even though marginal, for consistency with results for other dose.
		CDREBQQ	0.0286	0.0106	2.71	0.007	0.993	0.85								
		CINFOYN	-0.9515	0.3235	-2.94	0.004	0.996	0.85								
		CMVISSX	-0.8021	0.3203	-2.50	0.013	0.987	0.85								
		CMNUMCHD	-0.5428	0.3057	-1.78	0.077	0.923	0.85								

Annoyance vs. Relative Sound Level (Aircraft Leq minus Background Leq)

294470.03 White Sands Regression History

		Individual coefficients and their statistics							The entire model and its statistics							
			From Statistica				Calculated	Criterion	Reference		From Statistica	Calculated			Criterion	
Model	Purpose	Param	Value	Std. Err.	Stud. t	p	1 - p	1 - p	Model	- 2LogLike	- 2LogLike	G	Del df	1 - p	1 - p	Conclusions about this model
AR16	Try	CONST	-1.5371	0.6632	-2.32	0.021	0.979	0.85	AR15	209.969	209.508	0.461	1	0.503	0.90	Reject MNUMADD3.
	MNUMADD3	CDREBQQ	0.0297	0.0108	2.76	0.006	0.994	0.85								
		CINFOYN	-0.9332	0.3242	-2.88	0.004	0.996	0.85								
		CMVISSX	-0.7916	0.3204	-2.47	0.014	0.986	0.85								
		CMNUMCHD	-0.5764	0.3091	-1.86	0.063	0.937	0.85								
		CMNUMADD	0.2578	0.3058	0.84	0.400	0.600	0.85								
AR17	Try	CONST	-1.6501	0.6313	-2.61	0.009	0.991	0.85	AR15	209.969	205.880	4.089	1	0.957	0.90	Tentatively accept DACNUM, but try its log next.
	DACNUM	CDREBQQ	0.0266	0.0106	2.52	0.012	0.988	0.85								
		CINFOYN	-1.0844	0.3343	-3.24	0.001	0.999	0.85								
		CMVISSX	-0.8102	0.3197	-2.53	0.012	0.988	0.85								
		CMNUMCHD	-0.5839	0.3072	-1.90	0.058	0.942	0.85								
		CDACNUM	0.0573	0.0212	2.70	0.007	0.993	0.85								
AR18	Try	CONST	-2.2265	0.7136	-3.12	0.002	0.998	0.85	AR15	209.969	204.841	5.128	1	0.976	0.90	Tentatively accept DACNUML. However,
	DACNUML	CDREBQQ	0.0271	0.0106	2.57	0.011	0.989	0.85								DACNUM is a poor estimate of the actual number
		CINFOYN	-1.0301	0.3252	-3.17	0.002	0.998	0.85								of aircraft audible. For this reason compute a
		CMVISSX	-0.8080	0.3184	-2.54	0.012	0.988	0.85								better estimate, DNUMOH, from only the overhead
		CMNUMCHD	-0.5232	0.3047	-1.72	0.087	0.913	0.85								aircraft and use this in the following tests.
		CDACNUML	0.1252	0.0455	2.75	0.006	0.994	0.85								
IGNORE FROM AR19 THROUGH AR41, AS RESULT OF BELATINGLY ACCEPTING DACNUML INTO THE REGRESSION																
AR19	Try ,	CONST	-0.9341	0.8910	-1.05	0.295	0.705	0.85	AR15	209.969	184.970	24.999	1	1.000	0.90	Baseline for the following model.
	for only OHs	CDREBQQ	0.0194	0.0166	1.17	0.245	0.755	0.85								
		CINFOYN	-1.0281	0.3648	-2.82	0.005	0.995	0.85								
		CMVISSX	-0.8184	0.3595	-2.28	0.024	0.976	0.85								
		CMNUMCHD	-0.4816	0.3426	-1.41	0.161	0.839	0.85								
AR20	Try	CONST	-0.5676	0.9166	-0.62	0.536	0.464	0.85	AR19	184.970	181.481	3.489	1	0.938	0.90	Reject DNUMOH.
	DNUMOH	CDREBQQ	0.0028	0.0187	0.15	0.882	0.118	0.85								
		CINFOYN	-1.1729	0.3779	-3.10	0.002	0.998	0.85								
		CMVISSX	-0.8441	0.3648	-2.31	0.021	0.979	0.85								
		CMNUMCHD	-0.5801	0.3483	-1.67	0.097	0.903	0.85								
		CDNUMOH	0.0950	0.0415	2.29	0.023	0.977	0.85								
AR21	Try	CONST	-0.3208	0.9414	-0.34	0.734	0.266	0.85	AR19	184.970	179.290	5.680	1	0.983	0.90	Reject DNUMOHL. Previous success with
	DNUMOHL	CDREBQQ	-0.0107	0.0210	-0.51	0.611	0.389	0.85								DACNUM was because DACNUM had 0's in it,
		CINFOYN	-1.1787	0.3768	-3.13	0.002	0.998	0.85								whereas we were eliminating zero doses from
		CMVISSX	-0.8414	0.3703	-2.27	0.024	0.976	0.85								our analysis. DNUMOH variable has 0 set as the
		CMNUMCHD	-0.5697	0.3462	-1.65	0.101	0.899	0.85								"missing value" to eliminate those visitors
		CDNUMOHL	0.1449	0.0524	2.77	0.006	0.994	0.85								automatically.
AR22	Try	CONST	-0.4363	0.8158	-0.53	0.593	0.407	0.85	AR15	209.969	207.781	2.188	1	0.861	0.90	Reject HVISTM.
	HVISTM	CDREBQQ	0.0257	0.0106	2.41	0.016	0.984	0.85								
		CINFOYN	-0.9885	0.3238	-3.05	0.002	0.998	0.85								
		CMVISSX	-0.8403	0.3216	-2.61	0.009	0.991	0.85								
		CMNUMCHD	-0.5244	0.3058	-1.71	0.087	0.913	0.85								
		CHVISTM	-0.6007	0.3435	-1.75	0.081	0.919	0.85								
AR23	Try	CONST	-2.2755	0.7359	-3.09	0.002	0.998	0.85	AR15	209.969	203.531	6.438	1	0.989	0.90	Accept MIMPNQDV.
	MIMPNQDV	CDREBQQ	0.0276	0.0107	2.58	0.010	0.990	0.85								
		CINFOYN	-1.0049	0.3222	-3.12	0.002	0.998	0.85								
		CMVISSX	-0.8731	0.3186	-2.74	0.006	0.994	0.85								
		CMNUMCHD	-0.4934	0.3046	-1.62	0.106	0.894	0.85								
		CMIMPNQD	1.2554	0.4463	2.81	0.005	0.995	0.85								
AR24	Try	CONST	-2.5718	0.9298	-2.77	0.006	0.994	0.85	AR23	203.531	203.320	0.211	1	0.354	0.90	Reject MIMPSCDV.
	MIMPSCDV	CDREBQQ	0.0275	0.0107	2.58	0.010	0.990	0.85								
		CINFOYN	-1.0220	0.3241	-3.15	0.002	0.998	0.85								
		CMVISSX	-0.8669	0.3188	-2.72	0.007	0.993	0.85								
		CMNUMCHD	-0.4731	0.3084	-1.54	0.124	0.876	0.85								
		CMIMPNQD	1.2099	0.4522	2.68	0.008	0.992	0.85								
		CMIMPSCD	0.3516	0.6352	0.55	0.580	0.420	0.85								

		Individual coefficients and their statistics							The entire model and its statistics							
			From Statistica				Calculated	Criterion	Reference		From Statistica	Calculated			Criterion	
Model	Purpose	Param	Value	Std. Err.	Stud. t	p	1 - p	1 - p	Model	- 2LogLike	- 2LogLike	G	Del df	1 - p	1 - p	Conclusions about this model
AR25	Try MIMPHCDV	CONST	-2.2160	0.7369	-3.01	0.003	0.997	0.85	AR23	203.531	202.175	1.356	1	0.756	0.90	Reject MIMPHCDV.
		CDREBQQ	0.0279	0.0107	2.60	0.010	0.990	0.85								
		CINFOYN	-0.9858	0.3230	-3.05	0.002	0.998	0.85								
		CMVISSX	-0.7933	0.3227	-2.46	0.015	0.985	0.85								
		CMNUMCHD	-0.4675	0.3060	-1.53	0.128	0.872	0.85								
		CMIMPNQD	1.3553	0.4533	2.99	0.003	0.997	0.85								
		CMIMPHCD	-0.4521	0.3082	-1.47	0.143	0.857	0.85								
AR26	Try DSLMAX	CONST	-4.2672	1.6493	-2.59	0.010	0.990	0.85	AR23	203.531	201.466	2.065	1	0.849	0.90	Reject DSLMAX.
		CDREBQQ	-0.0182	0.0316	-0.58	0.566	0.434	0.85								
		CINFOYN	-1.0604	0.3352	-3.16	0.002	0.998	0.85								
		CMVISSX	-0.8546	0.3173	-2.69	0.007	0.993	0.85								
		CMNUMCHD	-0.5628	0.3129	-1.80	0.073	0.927	0.85								
		CMIMPNQD	1.2737	0.4596	2.77	0.006	0.994	0.85								
		CDSLMAX	0.0490	0.0321	1.52	0.128	0.872	0.85								
AR27	Try Specific interviewer	CONST	-2.5383	0.8075	-3.14	0.002	0.998	0.85	AR23	203.531	198.326	5.205	3	0.843	0.90	Reject Specific interviewer. But see AR40 (with Top).
		CDREBQQ	0.0262	0.0111	2.36	0.019	0.981	0.85								
		CINFOYN	-1.0015	0.3227	-3.10	0.002	0.998	0.85								
		CMVISSX	-0.8268	0.3212	-2.57	0.011	0.989	0.85								
		CMNUMCHD	-0.4550	0.3072	-1.48	0.140	0.860	0.85								
		CMIMPNQD	1.3401	0.4487	2.99	0.003	0.997	0.85								
		CHINT2	0.7224	0.4186	1.73	0.085	0.915	0.85								
		CHINT3	0.2812	0.3447	0.82	0.415	0.585	0.85								
		CHINT4	-1.2737	0.8653	-1.47	0.142	0.858	0.85								
AR28	Try Specific date	CONST	1.4766	1.4130	1.05	0.297	0.703	0.85	AR23	203.531	187.675	15.856	9	0.930	0.90	Specific date appears important. Since this is a so-called happenstance variable, we do not add it into the regression. The dependence upon specific date will widen the confidence region of the dose-response curve, once we jackknife by specific date. But see AR41 (with Top).
		CDREBQQ	0.0289	0.0113	2.55	0.011	0.989	0.85								
		CINFOYN	-1.5437	0.3718	-4.15	0.000	1.000	0.85								
		CMVISSX	-1.0172	0.3402	-2.99	0.003	0.997	0.85								
		CMNUMCHD	-0.6249	0.3192	-1.96	0.051	0.949	0.85								
		CMIMPNQD	1.4123	0.4576	3.09	0.002	0.998	0.85								
		C15	-2.9160	1.2093	-2.41	0.016	0.984	0.85								
		C16	-2.6070	1.1806	-2.21	0.028	0.972	0.85								
		C17	-4.2855	1.2783	-3.35	0.001	0.999	0.85								
		C18	-3.9762	1.3258	-3.00	0.003	0.997	0.85								
		C21	-4.1727	1.2407	-3.36	0.001	0.999	0.85								
		C22	-3.1663	1.1824	-2.68	0.008	0.992	0.85								
		C23	-3.9177	1.2630	-3.10	0.002	0.998	0.85								
		C24	-3.2987	1.2119	-2.72	0.007	0.993	0.85								
		C25	-4.4435	1.3307	-3.34	0.001	0.999	0.85								
AR29	Try Top	TOP	-1.2403	0.2406	-5.15	0.000	1.000	0.85	AR23	203.531	197.480	6.051	1	0.986	0.90	Accept Top.
		CONST	-0.9289	1.9000	-0.49	0.625	0.375	0.85								
		CDREBQQ	0.0935	0.0597	1.57	0.118	0.882	0.85								
		CINFOYN	-4.1714	2.3988	-1.74	0.083	0.917	0.85								
		CMVISSX	-2.2365	1.3508	-1.66	0.099	0.901	0.85								
		CMNUMCHD	-2.8702	1.6691	-1.72	0.086	0.914	0.85								
		CMIMPNQD	5.7970	3.8481	1.51	0.133	0.867	0.85								
AR30	Jackknife 1	TOP	-1.2440	?							190.494					To compute standard errors. HDT14 excluded. All convergences sought with modified Newton method.
		CONST	-0.3819	?												
		CDREBQQ	0.0766	?												
		CINFOYN	-3.8349	?												
		CMVISSX	-2.1828	?												
		CMNUMCHD	-2.3891	?												
		CMIMPNQD	4.9699	?												
AR31	Jackknife 2	TOP	-1.2715	?							179.453					To compute standard errors. HDT15 excluded.
		CONST	-0.3539	?												
		CDREBQQ	0.0787	?												
		CINFOYN	-3.2813	?												
		CMVISSX	-2.1926	?												
		CMNUMCHD	-2.6616	?												
		CMIMPNQD	4.9091	?												

		Individual coefficients and their statistics							The entire model and its statistics							
			From Statistica				Calculated	Criterion	Reference		From Statistica	Calculated			Criterion	
Model	Purpose	Param	Value	Std. Err.	Stud. t	p	1 - p	1 - p	Model	- 2LogLike	- 2LogLike	G	Del df	1 - p	1 - p	Conclusions about this model
AR32	Jackknife 3	TOP	-1.3794	?							171.649					To compute standard errors. HDT16 excluded.
		CONST	-2.2308	?												
		CDREBQQ	0.0884	?												
		CINFOYN	-4.1242	?												
		CMVISSX	-1.4229	?												
		CMNUMCHD	-3.0247	?												
		CMIMPNQD	6.2741	?												
AR33	Jackknife 4	TOP	-0.8474	?							172.446					To compute standard errors. HDT17 excluded.
		CONST	-0.6013	?												
		CDREBQQ	0.0759	?												
		CINFOYN	-2.8537	?												
		CMVISSX	-2.1626	?												
		CMNUMCHD	-2.2192	?												
		CMIMPNQD	3.5513	?												
AR34	Jackknife 5	TOP	-1.0916	?							185.202					To compute standard errors. HDT18 excluded.
		CONST	-1.1730	?												
		CDREBQQ	0.0781	?												
		CINFOYN	-3.0009	?												
		CMVISSX	-1.9093	?												
		CMNUMCHD	-1.9153	?												
		CMIMPNQD	4.2838	?												
AR35	Jackknife 6	TOP	-1.1407	?							171.778					To compute standard errors. HDT21 excluded.
		CONST	-0.7937	?												
		CDREBQQ	0.0857	?												
		CINFOYN	-3.6583	?												
		CMVISSX	-2.0094	?												
		CMNUMCHD	-2.9760	?												
		CMIMPNQD	5.3448	?												
AR36	Jackknife 7	TOP	-1.2522	?							168.067					To compute standard errors. HDT22 excluded.
		CONST	-2.0847	?												
		CDREBQQ	0.1004	?												
		CINFOYN	-4.2152	?												
		CMVISSX	-1.7035	?												
		CMNUMCHD	-1.9440	?												
		CMIMPNQD	5.2207	?												
AR37	Jackknife 8	TOP	-1.2960	?							178.278					To compute standard errors. HDT23 excluded.
		CONST	-0.7029	?												
		CDREBQQ	0.0957	?												
		CINFOYN	-4.3910	?												
		CMVISSX	-2.3330	?												
		CMNUMCHD	-3.1875	?												
		CMIMPNQD	6.2869	?												
AR38	Jackknife 9	TOP	-1.2324	?							158.038					To compute standard errors. HDT24 excluded.
		CONST	70.5008	?												Modified Newton method.
		CDREBQQ	4.2364	?												
		CINFOYN	-270.8317	?												
		CMVISSX	-160.4087	?												
		CMNUMCHD	-163.2159	?												
		CMIMPNQD	324.3146	?												
AR38	Jackknife 9	TOP	-0.1190	?							179.842					To compute standard errors. HDT24 excluded.
again	again, because of	CONST	-2.0738	?												Simplex method.
	extreme values for	CDREBQQ	0.0419	?												
	prior computation	CINFOYN	-1.4692	?												
		CMVISSX	-0.4218	?												
		CMNUMCHD	-1.0795	?												
		CMIMPNQD	1.2931	?												

		Individual coefficients and their statistics							The entire model and its statistics							
			From Statistica				Calculated	Criterion	Reference		From Statistica	Calculated			Criterion	
Model	Purpose	Param	Value	Std. Err.	Stud. t	p	1 - p	1 - p	Model	- 2LogLike	- 2LogLike	G	Del df	1 - p	1 - p	Conclusions about this model
AR39	Jackknife 10	TOP	-1.2041	?							184.817					To compute standard errors. HDT25 excluded.
		CONST	-0.8942	?												
		CDREBQQ	0.0969	?												
		CINFOYN	-4.3143	?												
		CMVISSX	-2.2746	?												
		CMNUMCHD	-2.7608	?												
		CMIMPNQD	5.8118	?												
AR40	Try Specific interviewer.	TOP	-1.0205	?					AR29	197.480	189.018	8.462	3	0.963	0.90	Reject Specific interviewer. Quasi-Newton convergence woult not yelld standard errors. Simplex convergence would not convert nor would it come anywhere close to the minimum loglikelihood shown to the left, here.
		CONST	-2.1659	?												
		CDREBQQ	0.0832	?												
		CINFOYN	-3.5241	?												
		CMVISSX	-2.3353	?												
		CMNUMCHD	-2.8905	?												
		CMIMPNQD	5.4684	?												
		CHINT2	2.0599	?												
		CHINT3	2.1012	?												
		CHINT4	-2.8274	?												
AR41	Try Specific date	TOP	-1.1457	?					AR29	197.480	169.361	28.119	9	0.999	0.90	Reject Specific date. QuasiNewton convergence produced the results here. Statistica reported "Predictors very redundant. Results are suspect.
		CONST	-115.4073	?												
		CDREBQQ	4.0285	?												
		CINFOYN	-168.9583	?												
		CMVISSX	-80.8379	?												
		CMNUMCHD	-93.8762	?												
		CMIMPNQD	259.5567	?												
		C15	-10.4317	?												
		C16	35.5594	?												
		C17	21.2799	?												
		C18	9.5184	?												
		C21	-70.2427	?												
		C22	51.3820	?												
		C23	-112.7026	?												
		C24	207.0393	?												
		C25	-145.6939	?												
PICK UP HERE AGAIN, AFTER ACCEPTING DACNUML INTO THE REGRESSION. HOWEVER, THEN IGNORE FROM AR42 THROUGH AR53 BECAUSE LATER CHANGED FROM DACNUL TO DNUMHRL.																
AR42	Try HVISTM	CONST	-1.5707	0.9591	-1.64	0.102	0.898	0.85	AR18	204.841	204.174	0.667	1	0.586	0.90	Reject HVISTM.
		CDREBQQ	0.0255	0.0107	2.38	0.018	0.982	0.85								
		CINFOYN	-1.0362	0.3248	-3.19	0.002	0.998	0.85								
		CMVISSX	-0.8264	0.3197	-2.59	0.010	0.990	0.85								
		CMNUMCHD	-0.5200	0.3052	-1.70	0.089	0.911	0.85								
		CDACNUML	0.1108	0.0476	2.33	0.021	0.979	0.85								
		CHVISTM	-0.3537	0.3548	-1.00	0.320	0.680	0.85								
AR43	Try MIMPNQDV	CONST	-2.9508	0.8006	-3.69	0.000	1.000	0.85	AR18	204.841	199.577	5.264	1	0.978	0.90	Accept MIMPNQDV. However, back up to test DNUMHRL as an alternative to DACNUML.
		CDREBQQ	0.0259	0.0107	2.42	0.016	0.984	0.85								
		CINFOYN	-1.0958	0.3268	-3.35	0.001	0.999	0.85								
		CMVISSX	-0.8567	0.3172	-2.70	0.007	0.993	0.85								
		CMNUMCHD	-0.4825	0.3041	-1.59	0.114	0.886	0.85								
		CDACNUML	0.1115	0.0455	2.45	0.015	0.985	0.85								
		CMIMPNQD	1.1589	0.4465	2.60	0.010	0.990	0.85								
AR44	Try DNUMHRL as alternative to DACNUML	CONST	-2.7019	0.8976	-3.01	0.003	0.997	0.85	AR15	209.969	206.492	3.477	1	0.938	0.90	Accept DNUMHRL as alternative to DACNUM (G statistic nearly as good. In addition, easier to use as an input to the regression.) But first, see if coefficients change when non-overhead visistors are excluded.
		CDREBQQ	0.0308	0.0108	2.86	0.005	0.995	0.85								
		CINFOYN	-0.9448	0.3224	-2.93	0.004	0.996	0.85								
		CMVISSX	-0.8141	0.3189	-2.55	0.011	0.989	0.85								
		CMNUMCHD	-0.5597	0.3051	-1.83	0.068	0.932	0.85								
		CDNUMHRL	1.1299	0.5042	2.24	0.026	0.974	0.85								
AR45	Try same, but only OH visitors	CONST	-2.1965	1.1884	-1.85	0.065	0.935	0.85	AR15	209.969	181.718	28.251	1	1.000	0.90	Coefficients not determined very precisely. However, it appears as if they are not surely different from their values when all visitors are included in the regression.
		CDREBQQ	0.0193	0.0173	1.12	0.266	0.734	0.85								
		CINFOYN	-1.0143	0.3668	-2.76	0.006	0.994	0.85								
		CMVISSX	-0.8279	0.3672	-2.25	0.025	0.975	0.85								
		CMNUMCHD	-0.4893	0.3430	-1.43	0.155	0.845	0.85								
		CDNUMHRL	1.1698	0.5806	2.01	0.045	0.955	0.85								

Annoyance vs. Relative Sound Level (Aircraft Leq minus Background Leq)

294470.03 White Sands Regression History

19 Feb 98 - 10 Mar 98

			Individual coefficients and their statistics						The entire model and its statistics							
			From Statistica				Calculated	Criterion	Reference		From Statistica	Calculated			Criterion	
Model	Purpose	Param	Value	Std. Err.	Stud. t	p	1 - p	1 - p	Model	- 2LogLike	- 2LogLike	G	Del df	1 - p	1 - p	Conclusions about this model
AR46	Repeat AR18,	CONST	-2.2265	0.7136	-3.12	0.002	0.998	0.85	AR15	209.969	204.841	5.128	1	0.976	0.90	Reference for following model.
	for reference	CDREBQQ	0.0271	0.0108	2.57	0.011	0.989	0.85								
	(DACNUML)	CINFOYN	-1.0301	0.3252	-3.17	0.002	0.998	0.85								
		CMVISSX	-0.8080	0.3184	-2.54	0.012	0.988	0.85								
		CMNUMCHD	-0.5232	0.3047	-1.72	0.087	0.913	0.85								
		CDACNUML	0.1252	0.0455	2.75	0.006	0.994	0.85								
AR47	Try	CONST	-1.6684	0.9597	-1.74	0.083	0.917	0.85	AR15	209.969	179.910	30.059	1	1.000	0.90	Same conclusions as Model 45.
	same, but only	CDREBQQ	0.0138	0.0174	0.80	0.427	0.573	0.85								Next try Models 44 and 46 with OVERHD added as
	OH visitors	CINFOYN	-1.1288	0.3673	-3.07	0.002	0.998	0.85								a mediator.
		CMVISSX	-0.8150	0.3574	-2.28	0.023	0.977	0.85								
		CMNUMCHD	-0.4351	0.3411	-1.28	0.203	0.797	0.85								
		CDACNUML	0.1330	0.0518	2.57	0.011	0.989	0.85								
AR48	Try	CONST	-2.9362	1.0655	-2.76	0.006	0.994	0.85	AR44	206.492	205.522	0.970	1	0.675	0.90	Reject OVERHD when combined with DNUMHRL.
	OVERHD with	CDREBQQ	0.0171	0.0152	1.13	0.261	0.739	0.85								
	DNUMHRL	CINFOYN	-0.9741	0.3285	-2.96	0.003	0.997	0.85								
		CMVISSX	-0.8116	0.3289	-2.47	0.014	0.986	0.85								
		CMNUMCHD	-0.5464	0.3069	-1.78	0.076	0.924	0.85								
		CDNUMHRL	1.1579	0.5294	2.19	0.029	0.971	0.85								
		COVERHD	0.8343	0.6894	1.21	0.227	0.773	0.85								
AR49	Try	CONST	-2.4456	0.8226	-2.97	0.003	0.997	0.85	AR46	204.841	203.873	0.968	1	0.675	0.90	Reject OVERHD when combined with DACNUML.
	OVERHD with	CDREBQQ	0.0127	0.0154	0.82	0.411	0.589	0.85								
	DACNUML	CINFOYN	-1.0627	0.3332	-3.19	0.002	0.998	0.85								
		CMVISSX	-0.8027	0.3288	-2.44	0.015	0.985	0.85								
		CMNUMCHD	-0.5059	0.3064	-1.65	0.100	0.900	0.85								
		CDACNUML	0.1277	0.0460	2.78	0.006	0.994	0.85								
		COVERHD	0.8558	0.7014	1.22	0.223	0.777	0.85								
AR50	Try	CONST	-1.8090	1.1142	-1.62	0.105	0.895	0.85	AR44	206.492	205.380	1.112	1	0.708	0.90	Reject HVISTM.
	HVISTM	CDREBQQ	0.0285	0.0109	2.61	0.009	0.991	0.85								
		CINFOYN	-0.9747	0.3231	-3.02	0.003	0.997	0.85								
		CMVISSX	-0.8409	0.3203	-2.63	0.009	0.991	0.85								
		CMNUMCHD	-0.5465	0.3057	-1.79	0.075	0.925	0.85								
		CDNUMHRL	0.9679	0.5141	1.88	0.061	0.939	0.85								
		CHVISTM	-0.4462	0.3496	-1.28	0.203	0.797	0.85								
AR51	Try	CONST	-2.0327	0.7205	-2.82	0.005	0.995	0.85	AR15	209.969	201.707	8.262	1	0.996	0.90	Case 60 was somewhat influential in prior
	DACNUML	CDREBQQ	0.0257	0.0105	2.46	0.015	0.985	0.85								DACNUML regression.
	without Case 60	CINFOYN	-1.1116	0.3347	-3.32	0.001	0.999	0.85								
		CMVISSX	-0.7575	0.3213	-2.36	0.019	0.981	0.85								
		CMNUMCHD	-0.6083	0.3102	-1.96	0.051	0.949	0.85								
		CDACNUML	0.1022	0.0458	2.23	0.026	0.974	0.85								
AR52	Try	CONST	-2.6275	0.9076	-2.89	0.004	0.996	0.85	AR15	209.969	201.744	8.225	1	0.996	0.90	Case 60 was somewhat influential in prior
	DNUMHRL	CDREBQQ	0.0289	0.0107	2.71	0.007	0.993	0.85								DNUMHRL regression. Coefficient on DNUMHRL
	without Case 60	CINFOYN	-1.0584	0.3320	-3.19	0.002	0.998	0.85								still about a factor of 10 greater than coefficient
		CMVISSX	-0.7600	0.3197	-2.38	0.018	0.982	0.85								on DACNUML in previous model.
		CMNUMCHD	-0.6548	0.3100	-2.11	0.035	0.965	0.85								
		CDNUMHRL	1.0990	0.5033	2.18	0.030	0.970	0.85								
AR53	Repeat AR51	CONST	-2.0327	0.7166	-2.84	0.005	0.995	0.85	AR15	209.969	201.707	8.262	1	0.996	0.90	Case 60 was somewhat influential in prior
	after eliminating	CDREBQQ	0.0257	0.0105	2.46	0.015	0.985	0.85								DNUMHRL regression. Coefficient on DNUMHRL
	factor of 10 from	CINFOYN	-1.1116	0.3339	-3.33	0.001	0.999	0.85								is now okay re coefficient on DACNUML in
	def of DACNUML	CMVISSX	-0.7575	0.3199	-2.37	0.018	0.982	0.85								previous model.
		CMNUMCHD	-0.6083	0.3100	-1.96	0.051	0.949	0.85								
		CDACNUML	1.0216	0.4583	2.23	0.027	0.973	0.85								
PICK UP HERE AGAIN, AFTER REPLACING DACNUML WITH DNUMHRL. BUT THEN IGNORE THROUG AR72, SINCE DREBQQ IN ERROR.																
AR54	Try	CONST	-2.6387	0.9080	-2.91	0.004	0.996	0.85	AR44	206.492	201.659	4.833	1	0.972	0.90	Accept DNUMHRL in its final form.
	DNUMHRL	CDREBQQ	0.0290	0.0107	2.71	0.007	0.993	0.85								
	and eliminate	CINFOYN	-1.0530	0.3323	-3.17	0.002	0.998	0.85								
	Cases 60 and	CMVISSX	-0.7561	0.3198	-2.36	0.019	0.981	0.85								
	61, permanently	CMNUMCHD	-0.6505	0.3104	-2.10	0.037	0.963	0.85								
		CDNUMHRL	1.1001	0.5035	2.18	0.030	0.970	0.85								

		Individual coefficients and their statistics							The entire model and its statistics							
			From Statistica				Calculated	Criterion	Reference		From Statistica	Calculated			Criterion	
Model	Purpose	Param	Value	Std. Err.	Stud. t	p	1 - p	1 - p	Model	- 2LogLike	- 2LogLike	G	Del df	1 - p	1 - p	Conclusions about this model
AR55	Try	CONST	-1.8081	1.1157	-1.62	0.106	0.894	0.85	AR54	201.659	200.708	0.951	1	0.671	0.90	Reject HVISTM.
	HVISTM	CDREBQQ	0.0268	0.0108	2.48	0.014	0.986	0.85								
		CINFOYN	-1.0780	0.3322	-3.24	0.001	0.999	0.85								
		CMVISSX	-0.7810	0.3201	-2.44	0.015	0.985	0.85								
		CMNUMCHD	-0.6363	0.3107	-2.05	0.041	0.959	0.85								
		CDNUMHRL	0.9502	0.5124	1.85	0.065	0.935	0.85								
		CHVISTM	-0.4155	0.3487	-1.19	0.234	0.766	0.85								
AR56	Try	CONST	-3.3551	1.1013	-3.05	0.003	0.997	0.85	AR54	201.659	196.211	5.448	1	0.980	0.90	Accept MIMPNQDV.
	MIMPNQDV	CDREBQQ	0.0273	0.0111	2.46	0.015	0.985	0.85								
		CINFOYN	-1.1096	0.3367	-3.30	0.001	0.999	0.85								
		CMVISSX	-0.8015	0.3242	-2.47	0.014	0.986	0.85								
		CMNUMCHD	-0.6043	0.3108	-1.94	0.053	0.947	0.85								
		CDNUMHRL	1.0086	0.5242	1.92	0.055	0.945	0.85								
		CMIMPNQD	1.1706	0.4504	2.60	0.010	0.990	0.85								
AR57	Try	CONST	-3.5936	1.3438	-2.67	0.008	0.992	0.85	AR56	196.211	196.069	0,142	1	0.294	0.90	Reject MIMPSCDV.
	MIMPSCDV	CDREBQQ	0.0272	0.0112	2.42	0.016	0.984	0.85								
		CINFOYN	-1.1226	0.3407	-3.29	0.001	0.999	0.85								
		CMVISSX	-0.7969	0.3248	-2.45	0.015	0.985	0.85								
		CMNUMCHD	-0.5844	0.3126	-1.87	0.062	0.938	0.85								
		CDNUMHRL	0.9990	0.5316	1.88	0.061	0.939	0.85								
		CMIMPNQD	1.1348	0.4547	2.50	0.013	0.987	0.85								
		CMIMPSCD	0.2920	0.6466	0.45	0.652	0.348	0.85								
AR58	Try	CONST	-3.2945	0.9661	-3.41	0.001	0.999	0.85	AR56	196.211	194.542	1.669	1	0.804	0.90	Reject MIMPHCDV.
	MIMPHCDV	CDREBQQ	0.0274	0.0108	2.54	0.011	0.989	0.85								
		CINFOYN	-1.0976	0.3318	-3.31	0.001	0.999	0.85								
		CMVISSX	-0.7144	0.3201	-2.23	0.026	0.974	0.85								
		CMNUMCHD	-0.5879	0.3107	-1.89	0.059	0.941	0.85								
		CDNUMHRL	1.0272	0.5074	2.02	0,044	0.956	0.85								
		CMIMPNQD	1.2864	0.4500	2.86	0.005	0.995	0.85								
		CMIMPHCD	-0.5095	0.3089	-1.65	0.100	0.900	0.85								
AR59	Try	CONST	-6.3612	?					AR56	196.211	192.890	3.321	1	0.932	0.90	Reject DSLMAX.
	DSLMAX	CDREBQQ	-0.0336	?												
		CINFOYN	-1.1760	?												
		CMVISSX	-0.7885	?												
		CMNUMCHD	-0.7053	?												
		CDNUMHRL	1.3132	?												
		CMIMPNQD	1.1894	?												
		CDSLMAX	0.0657	?												
AR60	Try	TOP	-1.2062	?					AR56	196.211	190.882	5.329	1	0.979	0.90	Reject Top after trying several methods of reaching convergence.
	Top	CONST	-5.0703	?												
		CDREBQQ	0.1112	?												
		CINFOYN	-5.0240	?												
		CMVISSX	-2.1495	?												
		CMNUMCHD	-3.5357	?												
		CDNUMHRL	2.9675	?												
		CMIMPNQD	6.5880	?												
AR61	Try	CONST	-3.6317	1.1095	-3.27	0.001	0.999	0.85	AR56	196.211	191.292	4.919	3	0.822	0.90	Specific interviewer not important.
	Specific	CDREBQQ	0.0258	0.0113	2.28	0.023	0.977	0.85								
	interviewer	CINFOYN	-1.0992	0.3329	-3.30	0.001	0.999	0.85								
		CMVISSX	-0.7456	0.3212	-2.32	0.021	0.979	0.85								
		CMNUMCHD	-0.5701	0.3125	-1.82	0.069	0.931	0.85								
		CDNUMHRL	1.0154	0.5205	1.95	0.052	0.948	0.85								
		CMIMPNQD	1.2618	0.4465	2.83	0.005	0.995	0.85								
		CHINT2	0.6767	0.4211	1.61	0.109	0.891	0.85								
		CHINT3	0.2872	0.3535	0.81	0.417	0.583	0.85								
		CHINT4	-1.2838	0.8619	-1.49	0.137	0.863	0.85								

		Individual coefficients and their statistics							The entire model and its statistics							
			From Statistica				Calculated	Criterion	Reference		From Statistica	Calculated			Criterion	
Model	Purpose	Param	Value	Std. Err.	Stud. t	p	1 - p	1 - p	Model	- 2LogLike	- 2LogLike	G	Del df	1 - p	1 - p	Conclusions about this model
AR62	Try	CONST	0.7266	2.1482	0.34	0.735	0.265	0.85	AR56	196.211	181.270	14.941	9	0.907	0.90	Specific date appears important. Since this is a
	Specific date	CDREBQQ	0.0281	0.0114	2.47	0.014	0.986	0.85								happenstance variable, we do not add it into the
		CINFOYN	-1.6412	0.5274	-3.11	0.002	0.998	0.85								regression. The dependence upon specific date
		CMVISSX	-0.9806	0.4651	-2.11	0.036	0.964	0.85								will widen the confidence region of the
		CMNUMCHD	-0.7466	0.3534	-2.11	0.035	0.965	0.85								dose-response curve, once we jackknife by
		CDNUMHRL	1.2535	0.7296	1.72	0.087	0.913	0.85								specific date.
		CMIMPNQD	1.2831	0.4677	2.74	0.006	0.994	0.85								
		C15	-3.4670	2.3461	-1.48	0.141	0.859	0.85								
		C16	-3.5381	2.3904	-1.48	0.140	0.860	0.85								
		C17	-4.8655	2.6892	-1.81	0.071	0.929	0.85								
		C18	-4.1765	2.4464	-1.71	0.089	0.911	0.85								
		C21	-4.3354	2.4243	-1.79	0.075	0.925	0.85								
		C22	-3.5632	2.2884	-1.56	0.120	0.880	0.85								
		C23	-4.6346	2.6639	-1.74	0.083	0.917	0.85								
		C24	-3.8815	2.4221	-1.60	0.110	0.890	0.85								
		C25	-4.9410	2.6937	-1.83	0.068	0.932	0.85								
AR63	Jackknife 1	CONST	-3.4725	1.1932	-2.91	0.004	0.996	0.85			185.647					To compute standard errors. HDT14 excluded.
		CDREBQQ	0.0242	0.0111	2.18	0.030	0.970	0.85								All convergences sought with Quasi-Newton
		CINFOYN	-1.3558	0.3643	-3.72	0.000	1.000	0.85								method.
		CMVISSX	-0.8506	0.3316	-2.56	0.011	0.989	0.85								
		CMNUMCHD	-0.5229	0.3094	-1.69	0.092	0.908	0.85								
		CDNUMHRL	1.2837	0.5660	2.27	0.024	0.976	0.85								
		CMIMPNQD	1.1177	0.4478	2.50	0.013	0.987	0.85								
AR64	Jackknife 2	CONST	-3.3909	1.1591	-2.93	0.004	0.996	0.85			175.279					To compute standard errors. HDT15 excluded.
		CDREBQQ	0.0265	0.0117	2.26	0.024	0.976	0.85								
		CINFOYN	-0.9943	0.3545	-2.80	0.005	0.995	0.85								
		CMVISSX	-0.7761	0.3398	-2.28	0.023	0.977	0.85								
		CMNUMCHD	-0.8265	0.3413	-2.42	0.016	0.984	0.85								
		CDNUMHRL	1.1594	0.5426	2.14	0.033	0.967	0.85								
		CMIMPNQD	1.0017	0.4525	2.21	0.028	0.972	0.85								
AR65	Jackknife 3	CONST	-4.3017	1.1306	-3.80	0.000	1.000	0.85			176.167					To compute standard errors. HDT16 excluded.
		CDREBQQ	0.0284	0.0114	2.50	0.013	0.987	0.85								
		CINFOYN	-0.8507	0.3354	-2.54	0.012	0.988	0.85								
		CMVISSX	-0.5387	0.3215	-1.68	0.095	0.905	0.85								
		CMNUMCHD	-0.2966	0.3203	-0.93	0.355	0.645	0.85								
		CDNUMHRL	0.8737	0.5307	1.65	0.101	0.899	0.85								
		CMIMPNQD	1.6528	0.5911	2.80	0.006	0.994	0.85								
AR66	Jackknife 4	CONST	-2.6846	1.0641	-2.52	0.012	0.988	0.85			170.151					To compute standard errors. HDT17 excluded.
		CDREBQQ	0.0331	0.0120	2.76	0.006	0.994	0.85								
		CINFOYN	-1.2072	0.3578	-3.37	0.001	0.999	0.85								
		CMVISSX	-1.1112	0.3582	-3.10	0.002	0.998	0.85								
		CMNUMCHD	-0.7881	0.3371	-2.34	0.020	0.980	0.85								
		CDNUMHRL	0.8055	0.5562	1.45	0.149	0.851	0.85								
		CMIMPNQD	1.0839	0.4584	2.36	0.019	0.981	0.85								
AR67	Jackknife 5	CONST	-3.8768	1.2236	-3.17	0.002	0.998	0.85			181.394					To compute standard errors. HDT18 excluded.
		CDREBQQ	0.0332	0.0123	2.70	0.007	0.993	0.85								
		CINFOYN	-1.0848	0.3402	-3.19	0.002	0.998	0.85								
		CMVISSX	-0.8450	0.3364	-2.51	0.013	0.987	0.85								
		CMNUMCHD	-0.4995	0.3162	-1.58	0.115	0.885	0.85								
		CDNUMHRL	1.0662	0.5630	1.89	0.059	0.941	0.85								
		CMIMPNQD	1.4400	0.5139	2.80	0.005	0.995	0.85								
AR68	Jackknife 6	CONST	-2.6634	1.1095	-2.40	0.017	0.983	0.85			170.618					To compute standard errors. HDT21 excluded.
		CDREBQQ	0.0212	0.0111	1.92	0.056	0.944	0.85								
		CINFOYN	-1.1345	0.3645	-3.11	0.002	0.998	0.85								
		CMVISSX	-0.7269	0.3493	-2.08	0.038	0.962	0.85								
		CMNUMCHD	-0.9380	0.3505	-2.68	0.008	0.992	0.85								
		CDNUMHRL	0.7260	0.5691	1.28	0.203	0.797	0.85								
		CMIMPNQD	1.0975	0.4593	2.39	0.018	0.982	0.85								

Annoyance vs. Relative Sound Level (Aircraft Leq minus Background Leq) **19 Feb 98 - 10 Mar 98**
294470.03 White Sands Regression History

			Individual coefficients and their statistics						The entire model and its statistics							
			From Statistica				Calculated	Criterion	Reference		From Statistica	Calculated			Criterion	
Model	Purpose	Param	Value	Std. Err.	Stud. t	p	1 - p	1 - p	Model	- 2LogLike	- 2LogLike	G	Del df	1 - p	1 - p	Conclusions about this model
AR69	Jackknife 7	CONST	-3.5829	1.2982	-2.76	0.006	0.994	0.85			163.011					To compute standard errors. HDT22 excluded.
		CDREBQQ	0.0297	0.0126	2.36	0.019	0.981	0.85								
		CINFOYN	-1.1333	0.3766	-3.01	0.003	0.997	0.85								
		CMVISSX	-0.9500	0.3698	-2.57	0.011	0.989	0.85								
		CMNUMCHD	-0.3049	0.3329	-0.92	0.361	0.639	0.85								
		CDNUMHRL	1.0856	0.5797	1.87	0.062	0.938	0.85								
		CMIMPNQD	1.2442	0.5213	2.39	0.018	0.982	0.85								
AR70	Jackknife 8	CONST	-2.9001	1.0290	-2.82	0.005	0.995	0.85			178.849					To compute standard errors. HDT23 excluded.
		CDREBQQ	0.0225	0.0115	1.96	0.051	0.949	0.85								
		CINFOYN	-1.0402	0.3460	-3.01	0.003	0.997	0.85								
		CMVISSX	-0.8734	0.3416	-2.56	0.011	0.989	0.85								
		CMNUMCHD	-0.5779	0.3237	-1.79	0.075	0.925	0.85								
		CDNUMHRL	0.9142	0.5104	1.79	0.074	0.926	0.85								
		CMIMPNQD	1.1190	0.4526	2.47	0.014	0.986	0.85								
AR71	Jackknife 9	CONST	-3.8565	1.2796	-3.01	0.003	0.997	0.85			171.567					To compute standard errors. HDT24 excluded.
		CDREBQQ	0.0306	0.0123	2.49	0.013	0.987	0.85								
		CINFOYN	-1.1729	0.3726	-3.15	0.002	0.998	0.85								
		CMVISSX	-0.6901	0.3422	-2.02	0.045	0.955	0.85								
		CMNUMCHD	-0.6909	0.3387	-2.04	0.042	0.958	0.85								
		CDNUMHRL	1.3257	0.6225	2.13	0.034	0.966	0.85								
		CMIMPNQD	1.0495	0.4617	2.27	0.024	0.976	0.85								
AR72	Jackknife 10	CONST	-3.0718	1.1010	-2.79	0.006	0.994	0.85			185.687					To compute standard errors. HDT25 excluded.
		CDREBQQ	0.0252	0.0115	2.20	0.029	0.971	0.85								
		CINFOYN	-1.1523	0.3485	-3.31	0.001	0.999	0.85								
		CMVISSX	-0.6826	0.3343	-2.04	0.042	0.958	0.85								
		CMNUMCHD	-0.6422	0.3284	-1.96	0.051	0.949	0.85								
		CDNUMHRL	0.8089	0.5294	1.53	0.128	0.872	0.85								
		CMIMPNQD	1.1134	0.4588	2.43	0.016	0.984	0.85								
PICK UP AGAIN HERE, AFTER CORRECTING DREBQQ.																
AR73	Null	CONST	-2.0794	0.1531	-13.58	0.000	1.000	0.85	----------	----------	226.043	----------	----------	----------	----------	This is the "null model."
AR74	Try DREBQQ	CONST	-3.1056	0.4073	-7.63	0.000	1.000	0.85	AR73	226.043	217.714	8.329	1	0.996	0.90	Accept DREBQQ.
		CDREBQQ	0.0320	0.0100	3.20	0.001	0.999	0.85								
AR75	Try OVERHD	CONST	-3.2321	0.5282	-6.12	0.000	1.000	0.85	AR74	217.714	217.575	0.139	1	0.291	0.90	Reject OVERHD.
		CDREBQQ	0.0278	0.0134	2.08	0.038	0.962	0.85								
		COVERHD	0.3058	0.6759	0.45	0.651	0.349	0.85								
AR76	Try INFOYN	CONST	-2.7015	0.3975	-6.80	0.000	1.000	0.85	AR74	217.714	210.001	7.713	1	0.995	0.90	Accept INFOYN.
		CDREBQQ	0.0316	0.0097	3.25	0.001	0.999	0.85								
		CINFOYN	-1.0650	0.3325	-3.20	0.001	0.999	0.85								
AR77	Try DACTIML	CONST	-5.5266	1.3352	-4.14	0.000	1.000	0.85	AR76	210.001	203.556	6.445	1	0.989	0.90	Reject DACTIML.
		CDREBQQ	0.0100	0.0119	0.84	0.402	0.598	0.85								
		CINFOYN	-1.1460	0.3350	-3.42	0.001	0.999	0.85								
		CDACTIML	2.2745	0.8705	2.61	0.009	0.991	0.85								
AR78	Try MVISSX	CONST	-1.6237	0.5777	-2.81	0.005	0.995	0.85	AR76	210.001	205.629	4.372	1	0.963	0.90	Accept MVISSX.
		CDREBQQ	0.0314	0.0099	3.17	0.002	0.998	0.85								
		CINFOYN	-1.0255	0.3310	-3.10	0.002	0.998	0.85								
		CMVISSX	-0.7736	0.3185	-2.43	0.016	0.984	0.85								
AR79	Try MVISAG	CONST	-0.9719	0.6746	-1.44	0.151	0.849	0.85	AR78	205.629	203.132	2.497	1	0.886	0.90	Reject MVISAG.
		CDREBQQ	0.0313	0.0099	3.15	0.002	0.998	0.85								
		CINFOYN	-0.9945	0.3317	-3.00	0.003	0.997	0.85								
		CMVISSX	-0.7341	0.3200	-2.29	0.022	0.978	0.85								
		CMVISAG	-0.0188	0.0106	-1.77	0.078	0.922	0.85								
AR80	Try MFRST	CONST	-2.0128	0.8321	-2.42	0.016	0.984	0.85	AR78	205.629	205.309	0.320	1	0.428	0.90	Reject MFRST.
		CDREBQQ	0.0315	0.0099	3.18	0.002	0.998	0.85								
		CINFOYN	-1.0170	0.3314	-3.07	0.002	0.998	0.85								
		CMVISSX	-0.7776	0.3188	-2.44	0.015	0.985	0.85								
		CMFRST	0.4197	0.6249	0.67	0.502	0.498	0.85								
AR81	Try MNUMCHD1	CONST	-1.3424	0.5856	-2.29	0.023	0.977	0.85	AR78	205.629	202.708	2.921	1	0.913	0.90	Accept MNUMCHD1.
		CDREBQQ	0.0301	0.0099	3.05	0.002	0.998	0.85								
		CINFOYN	-1.0676	0.3314	-3.22	0.001	0.999	0.85								
		CMVISSX	-0.7431	0.3181	-2.34	0.020	0.980	0.85								
		CMNUMCHD	-0.6461	0.3094	-2.09	0.038	0.962	0.85								

Annoyance vs. Relative Sound Level (Aircraft Leq minus Background Leq)

294470.03 White Sands Regression History

19 Feb 98 - 10 Mar 98

		Individual coefficients and their statistics							The entire model and its statistics							
			From Statistica				Calculated	Criterion	Reference		From Statistica	Calculated			Criterion	
Model	Purpose	Param	Value	Std. Err.	Stud. t	p	1 - p	1 - p	Model	- 2LogLike	- 2LogLike	G	Del df	1 - p	1 - p	Conclusions about this model
AR82	Try	CONST	-1.4963	0.6103	-2.45	0.015	0.985	0.85	AR81	202.708	202.109	0.599	1	0.561	0.90	Reject MNUMADD3.
	MNUMADD3	CDREBQQ	0.0310	0.0100	3.09	0.002	0.998	0.85								
		CINFOYN	-1.0479	0.3318	-3.16	0.002	0.998	0.85								
		CMVISSX	-0.7307	0.3182	-2.30	0.022	0.978	0.85								
		CMNUMCHD	-0.6862	0.3130	-2.19	0.029	0.971	0.85								
		CMNUMADD	0.2970	0.3045	0.98	0.330	0.670	0.85								
AR83	Try	CONST	-2.3498	0.8289	-2.83	0.005	0.995	0.85	AR81	202.708	200.396	2.312	1	0.872	0.90	Reject DNUMHRL.
	DNUMHRL	CDREBQQ	0.0297	0.0099	2.99	0.003	0.997	0.85								
		CINFOYN	-1.0631	0.3317	-3.20	0.001	0.999	0.85								
		CMVISSX	-0.7502	0.3190	-2.35	0.019	0.981	0.85								
		CMNUMCHD	-0.6645	0.3099	-2.14	0.033	0.967	0.85								
		CDNUMHRL	0.9358	0.4996	1.87	0.062	0.938	0.85								
AR84	Try	CONST	-0.5498	0.7924	-0.69	0.488	0.512	0.85	AR81	202.708	201.232	1.476	1	0.776	0.90	Reject HVISTM.
	HVISTM	CDREBQQ	0.0274	0.0099	2.77	0.006	0.994	0.85								
		CINFOYN	-1.0951	0.3379	-3.24	0.001	0.999	0.85								
		CMVISSX	-0.7741	0.3324	-2.33	0.021	0.979	0.85								
		CMNUMCHD	-0.6240	0.3124	-2.00	0.047	0.953	0.85								
		CHVISTM	-0.5032	0.3503	-1.44	0.152	0.848	0.85								
AR85	Try	CONST	-2.1962	0.6870	-3.20	0.002	0.998	0.85	AR81	202.708	196.843	5.865	1	0.985	0.90	Accept MIMPNQDV.
	MIMPNQDV	CDREBQQ	0.0289	0.0099	2.93	0.004	0.996	0.85								
		CINFOYN	-1.1205	0.3303	-3.39	0.001	0.999	0.85								
		CMVISSX	-0.8100	0.3169	-2.56	0.011	0.989	0.85								
		CMNUMCHD	-0.5962	0.3083	-1.93	0.054	0.946	0.85								
		CMIMPNQD	1.2116	0.4421	2.74	0.006	0.994	0.85								
AR86	Try	CONST	-2.4735	0.8858	-2.79	0.006	0.994	0.85	AR85	196.843	196.661	0.182	1	0.330	0.90	Reject MIMPSCDV.
	MIMPSCDV	CDREBQQ	0.0289	0.0099	2.93	0.004	0.996	0.85								
		CINFOYN	-1.1359	0.3321	-3.42	0.001	0.999	0.85								
		CMVISSX	-0.8038	0.3172	-2.53	0.012	0.988	0.85								
		CMNUMCHD	-0.5767	0.3102	-1.86	0.064	0.936	0.85								
		CMIMPNQD	1.1694	0.4480	2.61	0.009	0.991	0.85								
		CMIMPSCD	0.3280	0.6282	0.52	0.602	0.398	0.85								
AR87	Try	CONST	-2.1273	0.6870	-3.10	0.002	0.998	0.85	AR85	196.843	195.201	1.642	1	0.800	0.90	Reject MIMPHCDV.
	MIMPHCDV	CDREBQQ	0.0291	0.0099	2.94	0.004	0.996	0.85								
		CINFOYN	-1.1048	0.3313	-3.33	0.001	0.999	0.85								
		CMVISSX	-0.7163	0.3213	-2.23	0.027	0.973	0.85								
		CMNUMCHD	-0.5725	0.3095	-1.85	0.065	0.935	0.85								
		CMIMPNQD	1.3241	0.4493	2.95	0.003	0.997	0.85								
		CMIMPHCD	-0.5054	0.3088	-1.64	0.103	0.897	0.85								
AR88	Try	CONST	-2.7015	1.4537	-1.86	0.064	0.936	0.85	AR85	196.843	196.737	0.106	1	0.255	0.90	Reject DSLMAX.
	DSLMAX	CDREBQQ	0.0204	0.0226	0.90	0.367	0.633	0.85								
		CINFOYN	-1.1248	0.3316	-3.39	0.001	0.999	0.85								
		CMVISSX	-0.8099	0.3172	-2.55	0.011	0.989	0.85								
		CMNUMCHD	-0.5998	0.3090	-1.94	0.053	0.947	0.85								
		CMIMPNQD	1.2160	0.4446	2.74	0.007	0.993	0.85								
		CDSLMAX	0.0104	0.0253	0.41	0.682	0.318	0.85								
AR89	Try	CONST	-2.4412	0.7890	-3.09	0.002	0.998	0.85	AR85	196.843	192.010	4.833	3	0.816	0.90	Reject Specific interviewer.
	Specific	CDREBQQ	0.0275	0.0102	2.69	0.008	0.992	0.85								
	interviewer	CINFOYN	-1.1181	0.3351	-3.34	0.001	0.999	0.85								
		CMVISSX	-0.7711	0.3257	-2.37	0.019	0.981	0.85								
		CMNUMCHD	-0.5617	0.3120	-1.80	0.073	0.927	0.85								
		CMIMPNQD	1.3086	0.4481	2.92	0.004	0.996	0.85								
		CHINT2	0.7279	0.4168	1.75	0.082	0.918	0.85								
		CHINT3	0.2233	0.3470	0.64	0.520	0.480	0.85								
		CHINT4	-1.2357	0.8673	-1.42	0.155	0.845	0.85								

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		Individual coefficients and their statistics							The entire model and its statistics							
			From Statistica				Calculated	Criterion	Reference		From Statistica	Calculated			Criterion	
Model	Purpose	Param	Value	Std. Err.	Stud. t	p	1 - p	1 - p	Model	-2LogLike	-2LogLike	G	Del df	1 - p	1 - p	Conclusions about this model
AR90	Try	CONST	1.7070	1.5134	1.13	0.260	0.740	0.85	AR85	196.843	182.362	14.481	9	0.894	0.90	Reject Specific date, though close.
	Specific date	CDREBQQ	0.0293	0.0103	2.86	0.005	0.995	0.85								
		CINFOYN	-1.6768	0.4060	-4.13	0.000	1.000	0.85								
		CMVISSX	-0.9451	0.3553	-2.66	0.008	0.992	0.85								
		CMNUMCHD	-0.7447	0.3294	-2.26	0.024	0.976	0.85								
		CMIMPNQD	1.3228	0.4495	2.94	0.004	0.996	0.85								
		C15	-2.9338	1.3306	-2.20	0.028	0.972	0.85								
		C16	-2.9340	1.3293	-2.21	0.028	0.972	0.85								
		C17	-4.3408	1.4476	-3.00	0.003	0.997	0.85								
		C18	-4.0413	1.4811	-2.73	0.007	0.993	0.85								
		C21	-4.1888	1.4031	-2.99	0.003	0.997	0.85								
		C22	-3.2107	1.3148	-2.44	0.015	0.985	0.85								
		C23	-4.0264	1.4247	-2.83	0.005	0.995	0.85								
		C24	-3.3108	1.3433	-2.46	0.014	0.986	0.85								
		C25	-4.4950	1.4981	-3.00	0.003	0.997	0.85								
AR91	Jackknife 1	CONST	-2.0169	0.6816	-2.96	0.003	0.997	0.85			187.839					To compute standard errors. HDT14 excluded
		CDREBQQ	0.0258	0.0097	2.67	0.008	0.992	0.85								
		CINFOYN	-1.3497	0.3526	-3.83	0.000	1.000	0.85								
		CMVISSX	-0.8611	0.3221	-2.67	0.008	0.992	0.85								
		CMNUMCHD	-0.5131	0.3073	-1.67	0.096	0.904	0.85								
		CMIMPNQD	1.1692	0.4357	2.68	0.008	0.992	0.85								
AR92	Jackknife 2	CONST	-2.0621	0.7085	-2.91	0.004	0.996	0.85			176.925					To compute standard errors. HDT15 excluded
		CDREBQQ	0.0278	0.0103	2.70	0.007	0.993	0.85								
		CINFOYN	-1.0093	0.3488	-2.89	0.004	0.996	0.85								
		CMVISSX	-0.7868	0.3320	-2.37	0.018	0.982	0.85								
		CMNUMCHD	-0.8142	0.3378	-2.41	0.017	0.983	0.85								
		CMIMPNQD	1.0487	0.4459	2.35	0.019	0.981	0.85								
AR93	Jackknife 3	CONST	-3.2582	0.8456	-3.85	0.000	1.000	0.85			176.404					To compute standard errors. HDT16 excluded
		CDREBQQ	0.0289	0.0103	2.80	0.005	0.995	0.85								
		CINFOYN	-0.8494	0.3347	-2.54	0.012	0.988	0.85								
		CMVISSX	-0.5509	0.3221	-1.71	0.088	0.912	0.85								
		CMNUMCHD	-0.2984	0.3181	-0.94	0.349	0.651	0.85								
		CMIMPNQD	1.6992	0.5889	2.89	0.004	0.996	0.85								
AR94	Jackknife 4	CONST	-1.7248	0.7210	-2.39	0.017	0.983	0.85			169.474					To compute standard errors. HDT17 excluded
		CDREBQQ	0.0354	0.0109	3.24	0.001	0.999	0.85								
		CINFOYN	-1.2254	0.3522	-3.48	0.001	0.999	0.85								
		CMVISSX	-1.1205	0.3474	-3.23	0.001	0.999	0.85								
		CMNUMCHD	-0.7791	0.3335	-2.34	0.020	0.980	0.85								
		CMIMPNQD	1.0842	0.4524	2.40	0.017	0.983	0.85								
AR95	Jackknife 5	CONST	-2.6237	0.7489	-3.50	0.001	0.999	0.85			181.551					To compute standard errors. HDT18 excluded
		CDREBQQ	0.0360	0.0110	3.27	0.001	0.999	0.85								
		CINFOYN	-1.1248	0.3354	-3.35	0.001	0.999	0.85								
		CMVISSX	-0.8550	0.3297	-2.59	0.010	0.990	0.85								
		CMNUMCHD	-0.5210	0.3151	-1.65	0.099	0.901	0.85								
		CMIMPNQD	1.4685	0.4977	2.95	0.003	0.997	0.85								
AR96	Jackknife 6	CONST	-1.7937	0.6995	-2.56	0.011	0.989	0.85			170.675					To compute standard errors. HDT21 excluded
		CDREBQQ	0.0219	0.0098	2.22	0.027	0.973	0.85								
		CINFOYN	-1.1470	0.3568	-3.22	0.001	0.999	0.85								
		CMVISSX	-0.7272	0.3404	-2.14	0.034	0.966	0.85								
		CMNUMCHD	-0.9534	0.3461	-2.75	0.006	0.994	0.85								
		CMIMPNQD	1.1511	0.4548	2.53	0.012	0.988	0.85								
AR97	Jackknife 7	CONST	-2.3416	0.7877	-2.97	0.003	0.997	0.85			163.589					To compute standard errors. HDT22 excluded
		CDREBQQ	0.0318	0.0110	2.89	0.004	0.996	0.85								
		CINFOYN	-1.1571	0.3680	-3.14	0.002	0.998	0.85								
		CMVISSX	-0.9560	0.3578	-2.67	0.008	0.992	0.85								
		CMNUMCHD	-0.2991	0.3313	-0.90	0.367	0.633	0.85								
		CMIMPNQD	1.2981	0.5040	2.58	0.011	0.989	0.85								
AR98	Jackknife 8	CONST	-1.9214	0.7035	-2.73	0.007	0.993	0.85			179.336					To compute standard errors. HDT23 excluded
		CDREBQQ	0.0248	0.0104	2.39	0.017	0.983	0.85								
		CINFOYN	-1.0359	0.3407	-3.04	0.003	0.997	0.85								
		CMVISSX	-0.8755	0.3353	-2.61	0.009	0.991	0.85								
		CMNUMCHD	-0.5479	0.3203	-1.71	0.088	0.912	0.85								
		CMIMPNQD	1.1481	0.4504	2.55	0.011	0.989	0.85								

Annoyance vs. Relative Sound Level (Aircraft Leq minus Background Leq)
294470.03 White Sands Regression History

19 Feb 98 - 10 Mar 98

			Individual coefficients and their statistics						The entire model and its statistics							
			From Statistica				Calculated	Criterion	Reference		From Statistica	Calculated			Criterion	
Model	Purpose	Param	Value	Std. Err.	Stud. t	p	1 - p	1 - p	Model	- 2LogLike	- 2LogLike	G	Del df	1 - p	1 - p	Conclusions about this model
AR99	Jackknife 9	CONST	-2.3384	0.7258	-3.22	0.001	0.999	0.85			172.872					To compute standard errors. HDT24 excluded
		CDREBQQ	0.0325	0.0109	2.98	0.003	0.997	0.85								
		CINFOYN	-1.2006	0.3665	-3.28	0.001	0.999	0.85								
		CMVISSX	-0.7221	0.3368	-2.14	0.033	0.967	0.85								
		CMNUMCHD	-0.6521	0.3337	-1.95	0.052	0.948	0.85								
		CMIMPNQD	1.1054	0.4520	2.45	0.015	0.985	0.85								
AR100	Jackknife 10	CONST	-2.1373	0.7063	-3.03	0.003	0.997	0.85			185.725					To compute standard errors. HDT25 excluded
		CDREBQQ	0.0263	0.0102	2.58	0.010	0.990	0.85								
		CINFOYN	-1.1697	0.3409	-3.40	0.001	0.999	0.85								
		CMVISSX	-0.6789	0.3269	-2.08	0.039	0.961	0.85								
		CMNUMCHD	-0.6361	0.3254	-1.95	0.052	0.948	0.85								
		CMIMPNQD	1.1482	0.4527	2.54	0:012	0.988	0.85								

Interference with Natural Quiet vs. Relative Sound Level (Aircraft Leq minus Background Leq) — **23 Feb 98 - 11 Mar 98**

294470.03 White Sands Regression History

		Individual coefficients and their statistics							The entire model and its statistics							
			From Statistica				Calculated	Criterion	Reference		From Statistica	Calculated			Criterion	
Model	Purpose	Param	Value	Std. Err.	Stud. t	p	1 - p	1 - p	Model	- 2LogLike	- 2LogLike	G	Del df	1 - p	1 - p	Conclusions about this model
IR1	Null case	CONST	-1.0380	0.1371	-7.57	0.000			----------	----------	373.529	----------	----------	----------	----------	Null case, which is baseline for the following case.
IR2	Try	CONST	-2.5459	0.4476	-5.69	0.000	1.000	0.85	IR1	373.529	351.081	22.448	1	1.000	0.90	Accept DREBQQ.
	DREBQQ	CDREBQQ	0.0416	0.0105	3.96	0.000	1.000	0.85								
IR3	Try	TOP	-0.2477	1.2448	-0.20	0.842	0.158	0.85	IR2	351.081	350.211	0.870	1	0.649	0.90	Reject Top at this stage of the analysis.
	Top	CONST	-2.0934	0.7650	-2.74	0.007	0.993	0.85								
		CDREBQQ	0.0756	0.0858	0.88	0.379	0.621	0.85								
IR4	Try	CONST	-2.7895	0.5267	-5.30	0.000	1.000	0.85	IR2	351.081	347.590	3.491	2	0.825	0.90	Reject OHNOST/OHSOMEST.
	OHNOST	CDREBQQ	0.0354	0.0144	2.46	0.014	0.986	0.85								
	OHSOMEST	COHNOST	0.7560	0.6163	1.23	0.221	0.779	0.85								
		COHSOMES	0.3411	0.6617	0.52	0.607	0.393	0.85								
IR5	Try	CONST	-2.7363	0.5259	-5.20	0.000	1.000	0.85	IR2	351.081	349.759	1.322	1	0.750	0.90	Reject OVERHD.
	OVERHD	CDREBQQ	0.0310	0.0139	2.22	0.027	0.973	0.85								
		COVERHD	0.6734	0.6180	1.09	0.277	0.723	0.85								
IR6	Try	CONST	-2.5084	0.4738	-5.29	0.000	1.000	0.85	IR2	351.081	350.979	0.102	2	0.050	0.90	Reject INFONPS/INFOOTH.
	INFONPS	CDREBQQ	0.0416	0.0106	3.92	0.000	1.000	0.85								
	INFOOTH	CINFONPS	-0.0580	0.3606	-0.16	0.872	0.128	0.85								
		CINFOOTH	-0.0961	0.3254	-0.30	0.768	0.232	0.85								
IR7	Try	CONST	-2.5054	0.4712	-5.32	0.000	1.000	0.85	IR2	351.081	350.988	0.093	1	0.240	0.90	Reject INFOYN.
	INFOYN	CDREBQQ	0.0415	0.0105	3.94	0.000	1.000	0.85								
		CINFOYN	-0.0798	0.2738	-0.29	0.771	0.229	0.85								
IR8	IR2, but	CONST	-2.0394	0.7235	-2.82	0.005	0.995	0.85	IR2	351.081	309.111	41.970	1	1.000	0.90	Construct baseline for following model.
	filtered out if	CDREBQQ	0.0305	0.0164	1.86	0.064	0.936	0.85								
	MDISCLS = -9999															
IR9	Try	CONST	?						IR8	309.111						Reject MDISCLS. Predictors were so redundant that Statistica could not compute regression by either Quasi-Newton or Simplex.
	MDISCLS	CREBQQ	?													
		CMDISCLS	?													
IR10	Try	CONST	-1.2093	1.4316	-0.84	0.399	0.601	0.85	IR8	309.111	308.567	0.544	1	0.539	0.90	Reject MSELCLS.
	MSELCLS	CDREBQQ	0.0392	0.0212	1.85	0.066	0.934	0.85								
		CMSELCLS	-0.0136	0.0213	-0.64	0.523	0.477	0.85								
IR11	Try	CONST	-2.8102	0.8130	-3.46	0.001	0.999	0.85	IR2	351.081	350.855	0.226	1	0.365	0.90	Reject DACTIML.
	DACTIML	CDREBQQ	0.0392	0.0114	3.44	0.001	0.999	0.85								
		CDACTIML	0.2332	0.5246	0.44	0.657	0.343	0.85								
IR12	Try	CONST	-1.4615	0.5627	-2.60	0.010	0.990	0.85	IR2	351.081	341.507	9.574	1	0.998	0.90	Accept MVISSX.
	MVISSX	CDREBQQ	0.0429	0.0104	4.11	0.000	1.000	0.85								
		CMVISSX	-0.7888	0.2879	-2.74	0.006	0.994	0.85								
IR13	Try	CONST	-0.5627	0.6445	-0.87	0.383	0.617	0.85	IR12	341.507	331.794	9.713	1	0.998	0.90	Accept MVISAG.
	MVISAG	CDREBQQ	0.0427	0.0103	4.15	0.000	1.000	0.85								
		CMVISSX	-0.7206	0.2893	-2.49	0.013	0.987	0.85								
		CMVISAG	-0.0264	0.0102	-2.59	0.010	0.990	0.85								
IR14	Try	CONST	-0.3801	0.7813	-0.49	0.627	0.373	0.85	IR13	331.794	331.616	0.178	1	0.327	0.90	Reject MFRST.
	MFRST	CDREBQQ	0.0428	0.0103	4.14	0.000	1.000	0.85								
		CMVISSX	-0.7172	0.2902	-2.47	0.014	0.986	0.85								
		CMVISAG	-0.0267	0.0102	-2.61	0.010	0.990	0.85								
		CMFRST	-0.1975	0.4757	-0.42	0.678	0.322	0.85								
IR15	Try	CONST	-0.2867	0.6440	-0.45	0.657	0.343	0.85	IR13	331.794	324.132	7.662	1	0.994	0.90	Accept MNUMCHD1.
	MNUMCHD1	CDREBQQ	0.0402	0.0102	3.93	0.000	1.000	0.85								
		CMVISSX	-0.6839	0.2891	-2.37	0.019	0.981	0.85								
		CMVISAG	-0.0238	0.0099	-2.41	0.017	0.983	0.85								
		CMNUMCHD	-0.7691	0.2862	-2.69	0.008	0.992	0.85								
IR16	Try	CONST	-0.1668	0.6821	-0.24	0.807	0.193	0.85	IR15	324.132	323.828	0.304	1	0.419	0.90	Reject MNUMADD3.
	MNUMADD3	CDREBQQ	0.0397	0.0102	3.88	0.000	1.000	0.85								
		CMVISSX	-0.6911	0.2905	-2.38	0.018	0.982	0.85								
		CMVISAG	-0.0249	0.0102	-2.43	0.015	0.985	0.85								
		CMNUMCHD	-0.7447	0.2900	-2.57	0.011	0.989	0.85								
		CMNUMADD	-0.1640	0.3030	-0.54	0.589	0.411	0.85								
IGNORE FROM IR17 TO IR37. IR38 PICKS UP AGAIN WITH NEW "NUMBER" VARIABLE, DNUMHRL.																
IR17	Same as IR15,	CONST	-0.0071	0.8618	-0.01	0.993	0.007	0.85	IR15	324.132	288.041	36.091	1	1.000	0.90	Baseline for following model.
	but filtered on	CDREBQQ	0.0290	0.0157	1.85	0.066	0.934	0.85								
	DNUMOH	CMVISSX	-0.6289	0.3225	-1.95	0.052	0.948	0.85								
		CMVISAG	-0.0202	0.0109	-1.85	0.065	0.935	0.85								
		CMNUMCHD	-0.7215	0.3220	-2.24	0.026	0.974	0.85								

Interference with Natural Quiet vs. Relative Sound Level (Aircraft Leq minus Background Leq)

294470.03 White Sands Regression History

23 Feb 98 - 11 Mar 98

		Individual coefficients and their statistics	From Statistica				Calculated	Criterion	The entire model and its statistics: Reference		From Statistica	Calculated			Criterion	
Model	Purpose	Param	Value	Std. Err.	Stud. t	p	1 - p	1 - p	Model	- 2LogLike	- 2LogLike	G	Del df	1 - p	1 - p	Conclusions about this model
IR18	Try DNUMOH	CONST	0.0423	0.8689	0.05	0.961	0.039	0.85	IR17	288.041	287.606	0.435	1	0.490	0.90	Reject DNUMOH.
		CDREBQQ	0.0246	0.0174	1.42	0.158	0.842	0.85								
		CMVISSX	-0.6364	0.3229	-1.97	0.050	0.950	0.85								
		CMVISAG	-0.0191	0.0110	-1.73	0.084	0.916	0.85								
		CMNUMCHD	-0.7455	0.3254	-2.29	0.023	0.977	0.85								
		CDNUMOH	0.0256	0.0418	0.61	0.541	0.459	0.85								
IR19	Try DNUMOHL	CONST	0.0614	0.8746	0.07	0.944	0.056	0.85	IR17	288.041	287.727	0.314	1	0.425	0.90	Reject DNUMOHL.
		CDREBQQ	0.0236	0.0189	1.25	0.214	0.786	0.85								
		CMVISSX	-0.6351	0.3234	-1.96	0.051	0.949	0.85								
		CMVISAG	-0.0190	0.0112	-1.70	0.091	0.909	0.85								
		CMNUMCHD	-0.7363	0.3241	-2.27	0.024	0.976	0.85								
		CDNUMOHL	0.0255	0.0494	0.52	0.605	0.395	0.85								
IR20	Try HVISTM	CONST	0.1648	0.8414	0.20	0.845	0.155	0.85	IR15	324.132	323.417	0.715	1	0.602	0.90	Reject HVISTM.
		CDREBQQ	0.0388	0.0103	3.77	0.000	1.000	0.85								
		CMVISSX	-0.6964	0.2906	-2.40	0.017	0.983	0.85								
		CMVISAG	-0.0250	0.0100	-2.50	0.013	0.987	0.85								
		CMNUMCHD	-0.7639	0.2868	-2.66	0.008	0.992	0.85								
		CHVISTM	-0.2515	0.3038	-0.83	0.409	0.591	0.85								
IR21	Try MIMPNQDV	CONST	-0.6566	0.6827	-0.96	0.337	0.663	0.85	IR15	324.132	320.933	3.199	1	0.926	0.90	Accept MIMPNQDV.
		CDREBQQ	0.0390	0.0103	3.79	0.000	1.000	0.85								
		CMVISSX	-0.7191	0.2905	-2.48	0.014	0.986	0.85								
		CMVISAG	-0.0237	0.0099	-2.41	0.017	0.983	0.85								
		CMNUMCHD	-0.7476	0.2865	-2.61	0.009	0.991	0.85								
		CMIMPNQD	0.5923	0.3426	1.73	0.085	0.915	0.85								
IR22	Try MIMPSCDV	CONST	-1.4722	0.9075	-1.62	0.106	0.894	0.85	IR21	320.933	318.357	2.576	1	0.892	0.90	Reject MIMPSCDV.
		CDREBQQ	0.0391	0.0103	3.79	0.000	1.000	0.85								
		CMVISSX	-0.7193	0.2895	-2.48	0.013	0.987	0.85								
		CMVISAG	-0.0238	0.0099	-2.40	0.017	0.983	0.85								
		CMNUMCHD	-0.7014	0.2876	-2.44	0.015	0.985	0.85								
		CMIMPNQD	0.4677	0.3505	1.33	0.183	0.817	0.85								
		CMIMPSCD	0.9582	0.6589	1.45	0.147	0.853	0.85								
IR23	Try MIMPHCDV	CONST	-0.6498	0.6848	-0.95	0.343	0.657	0.85	IR21	320.933	320.900	0.033	1	0.144	0.90	Reject MIMPHCDV.
		CDREBQQ	0.0390	0.0103	3.79	0.000	1.000	0.85								
		CMVISSX	-0.7102	0.2949	-2.41	0.017	0.983	0.85								
		CMVISAG	-0.0236	0.0099	-2.37	0.018	0.982	0.85								
		CMNUMCHD	-0.7445	0.2874	-2.59	0.010	0.990	0.85								
		CMIMPNQD	0.6008	0.3464	1.73	0.084	0.916	0.85								
		CMIMPHCD	-0.0542	0.3011	-0.18	0.857	0.143	0.85								
IR24	Try DSLMAX	CONST	-0.6541	1.2411	-0.53	0.599	0.401	0.85	IR21	320.933	320.933	0.000	1	0.000	0.90	Reject DSLMAX.
		CDREBQQ	0.0390	0.0259	1.51	0.132	0.868	0.85								
		CMVISSX	-0.7191	0.2901	-2.48	0.014	0.986	0.85								
		CMVISAG	-0.0237	0.0099	-2.41	0.017	0.983	0.85								
		CMNUMCHD	-0.7475	0.2878	-2.60	0.010	0.990	0.85								
		CMIMPNQD	0.5922	0.3433	1.73	0.085	0.915	0.85								
		CDSLMAX	-0.0001	0.0249	-0.00	0.998	0.002	0.85								
IR25	Try Top	TOP	0.3542	?					IR21	320.933	319.426	1.507	1	0.780	0.90	Reject Top.
		CONST	0.6143	?												
		CDREBQQ	0.0619	?												
		CMVISSX	-1.1441	?												
		CMVISAG	-0.0378	?												
		CMNUMCHD	-1.0225	?												
		CMIMPNQD	0.8205	?												
IR26	Try Specific Interviewer	CONST	-1.0754	0.7839	-1.37	0.171	0.829	0.85	IR21	320.933	316.340	4.593	3	0.796	0.90	Reject Specific Interviewer.
		CDREBQQ	0.0388	0.0105	3.69	0.000	1.000	0.85								
		CMVISSX	-0.6350	0.2930	-2.17	0.031	0.969	0.85								
		CMVISAG	-0.0219	0.0101	-2.16	0.031	0.969	0.85								
		CMNUMCHD	-0.7156	0.2887	-2.48	0.014	0.986	0.85								
		CMIMPNQD	0.6065	0.3460	1.75	0.081	0.919	0.85								
		CHINT2	-0.0134	0.4449	-0.03	0.976	0.024	0.85								
		CHINT3	0.5713	0.3357	1.70	0.090	0.910	0.85								
		CHINT4	-0.1504	0.5165	-0.29	0.771	0.229	0.85								

Interference with Natural Quiet vs. Relative Sound Level (Aircraft Leq minus Background Leq) 23 Feb 98 - 11 Mar 98

294470.03 White Sands Regression History

		Individual coefficients and their statistics							The entire model and its statistics							
			From Statistica				Calculated	Criterion	Reference		From Statistica	Calculated			Criterion	
Model	Purpose	Param	Value	Std. Err.	Stud. t	p	1 - p	1 - p	Model	- 2LogLike	- 2LogLike	G	Del df	1 - p	1 - p	Conclusions about this model
IR27	Try	CONST	24.6392	?					IR21	320.933	302.341	18.592	9	0.971	0.90	Reject Specific date.
	Specific date	CDREBQQ	0.0391	?												
		CMVISSX	-0.8947	?												
		CMVISAG	-0.0155	?												
		CMNUMCHD	-0.9254	?												
		CMIMPNQD	0.5935	?												
		C15	-25.1389	?												
		C16	-24.8428	?												
		C17	-26.6928	?												
		C18	-25.6698	?												
		C21	-25.6662	?												
		C22	-25.0016	?												
		C23	-25.2986	?												
		C24	-24.8620	?												
		C25	-25.0349	?												
IR28	Jackknife 1	CONST	-0.6208	0.6827	-0.91	0.364	0.636	0.85			315.413					To compute standard errors. HDT14 excluded. All convergences sought with quasi-Newton Method.
		CDREBQQ	0.0379	0.0103	3.68	0.000	1.000	0.85								
		CMVISSX	-0.7713	0.2946	-2.62	0.009	0.991	0.85								
		CMVISAG	-0.0215	0.0099	-2.18	0.030	0.970	0.85								
		CMNUMCHD	-0.7676	0.2886	-2.66	0.008	0.992	0.85								
		CMIMPNQD	0.5578	0.3419	1.63	0.104	0.896	0.85								
IR29	Jackknife 2	CONST	-1.0656	0.7283	-1.46	0.145	0.855	0.85			290.205					To compute standard errors. HDT15 excluded.
		CDREBQQ	0.0412	0.0108	3.82	0.000	1.000	0.85								
		CMVISSX	-0.6436	0.3020	-2.13	0.034	0.966	0.85								
		CMVISAG	-0.0197	0.0102	-1.93	0.054	0.946	0.85								
		CMNUMCHD	-0.7976	0.3039	-2.62	0.009	0.991	0.85								
		CMIMPNQD	0.6807	0.3649	1.87	0.063	0.937	0.85								
IR30	Jackknife 3	CONST	-0.9283	0.7382	-1.26	0.210	0.790	0.85			286.926					To compute standard errors. HDT16 excluded.
		CDREBQQ	0.0398	0.0108	3.68	0.000	1.000	0.85								
		CMVISSX	-0.7170	0.3059	-2.34	0.020	0.980	0.85								
		CMVISAG	-0.0197	0.0101	-1.95	0.052	0.948	0.85								
		CMNUMCHD	-0.6709	0.3019	-2.22	0.027	0.973	0.85								
		CMIMPNQD	0.5952	0.3712	1.60	0.110	0.890	0.85								
IR31	Jackknife 4	CONST	-0.2358	0.7258	-0.32	0.746	0.254	0.85			286.700					To compute standard errors. HDT17 excluded.
		CDREBQQ	0.0394	0.0109	3.60	0.000	1.000	0.85								
		CMVISSX	-0.8903	0.3116	-2.86	0.005	0.995	0.85								
		CMVISAG	-0.0218	0.0106	-2.05	0.041	0.959	0.85								
		CMNUMCHD	-0.8169	0.3046	-2.68	0.008	0.992	0.85								
		CMIMPNQD	0.4737	0.3604	1.31	0.190	0.810	0.85								
IR32	Jackknife 5	CONST	-0.6865	0.7017	-0.98	0.329	0.671	0.85			302.592					To compute standard errors. HDT18 excluded.
		CDREBQQ	0.0412	0.0110	3.76	0.000	1.000	0.85								
		CMVISSX	-0.7605	0.3013	-2.52	0.012	0.988	0.85								
		CMVISAG	-0.0244	0.0101	-2.41	0.017	0.983	0.85								
		CMNUMCHD	-0.6657	0.2941	-2.26	0.024	0.976	0.85								
		CMIMPNQD	0.6074	0.3549	1.71	0.088	0.912	0.85								
IR33	Jackknife 6	CONST	-0.5525	0.7221	-0.77	0.445	0.555	0.85			272.074					To compute standard errors. HDT21 excluded.
		CDREBQQ	0.0357	0.0107	3.34	0.001	0.999	0.85								
		CMVISSX	-0.6464	0.3124	-2.07	0.039	0.961	0.85								
		CMVISAG	-0.0253	0.0111	-2.27	0.024	0.976	0.85								
		CMNUMCHD	-0.8429	0.3136	-2.69	0.008	0.992	0.85								
		CMIMPNQD	0.6863	0.3684	1.86	0.064	0.936	0.85								
IR34	Jackknife 7	CONST	-0.7897	0.7960	-0.99	0.322	0.678	0.85			263.975					To compute standard errors. HDT22 excluded.
		CDREBQQ	0.0422	0.0116	3.65	0.000	1.000	0.85								
		CMVISSX	-0.7262	0.3168	-2.29	0.023	0.977	0.85								
		CMVISAG	-0.0271	0.0109	-2.49	0.013	0.987	0.85								
		CMNUMCHD	-0.6956	0.3143	-2.21	0.028	0.972	0.85								
		CMIMPNQD	0.6912	0.3885	1.78	0.076	0.924	0.85								
IR35	Jackknife 8	CONST	-0.5854	0.7282	-0.80	0.422	0.578	0.85			292.044					To compute standard errors. HDT23 excluded.
		CDREBQQ	0.0373	0.0113	3.31	0.001	0.999	0.85								
		CMVISSX	-0.7111	0.3126	-2.27	0.024	0.976	0.85								
		CMVISAG	-0.0244	0.0105	-2.33	0.021	0.979	0.85								
		CMNUMCHD	-0.7284	0.2998	-2.43	0.016	0.984	0.85								
		CMIMPNQD	0.5873	0.3586	1.64	0.103	0.897	0.85								

Interference with Natural Quiet vs. Relative Sound Level (Aircraft Leq minus Background Leq)

294470.03 White Sands Regression History

Model	Purpose	Param	Individual coefficients and their statistics: From Statistica: Value	Std. Err.	Stud. t	p	Calculated 1 - p	Criterion 1 - p	The entire model and its statistics: Reference Model	Reference - 2LogLike	From Statistica - 2LogLike	Calculated G	Del df	1 - p	Criterion 1 - p	Conclusions about this model
IR36	Jackknife 9	CONST	-0.5941	0.7137	-0.83	0.406	0.594	0.85			282.027					To compute standard errors. HDT24 excluded.
		CDREBQQ	0.0388	0.0110	3.54	0.000	1.000	0.85								
		CMVISSX	-0.6322	0.3146	-2.01	0.045	0.955	0.85								
		CMVISAG	-0.0298	0.0110	-2.70	0.007	0.993	0.85								
		CMNUMCHD	-0.6400	0.3067	-2.09	0.038	0.962	0.85								
		CMIMPNQD	0.5270	0.3596	1.47	0.144	0.856	0.85								
IR37	Jackknife 10	CONST	-0.5771	0.7008	-0.82	0.411	0.589	0.85			291.993					To compute standard errors. HDT25 excluded.
		CDREBQQ	0.0372	0.0108	3.45	0.001	0.999	0.85								
		CMVISSX	-0.6857	0.3047	-2.25	0.025	0.975	0.85								
		CMVISAG	-0.0237	0.0103	-2.30	0.022	0.978	0.85								
		CMNUMCHD	-0.8830	0.3054	-2.89	0.004	0.996	0.85								
		CMIMPNQD	0.5496	0.3570	1.54	0.125	0.875	0.85								
PICK UP AGAIN HERE, AFTER ADOPTING NEW "NUMBER" VARIABLE, DNUMHRL. BUT THEN OMIT FROM IR38 TO IR 56, BECAUSE REDEFINED DREBQQ.																
IR38	Try DNUMHRL	CONST	-0.1025	0.8027	-0.13	0.899	0.101	0.85	IR 15	324.132	319.130	5.002	1	0.975	0.90	Reject DNUMHRL.
		CDREBQQ	0.0385	0.0102	3.77	0.000	1.000	0.85								
		CMVISSX	-0.6924	0.2968	-2.33	0.020	0.980	0.85								
		CMVISAG	-0.0226	0.0100	-2.25	0.025	0.975	0.85								
		CMNUMCHD	-0.8435	0.2921	-2.89	0.004	0.996	0.85								
		CDNUMHRL	-0.1417	0.4400	-0.32	0.748	0.252	0.85								
IR39	Try HVISTM	CONST	0.1220	0.8438	0.14	0.885	0.115	0.85	IR 15	324.132	318.738	5.394	1	0.980	0.90	Reject HVISTM.
		CDREBQQ	0.0374	0.0103	3.65	0.000	1.000	0.85								
		CMVISSX	-0.7044	0.3019	-2.33	0.020	0.980	0.85								
		CMVISAG	-0.0235	0.0103	-2.29	0.023	0.977	0.85								
		CMNUMCHD	-0.8382	0.2933	-2.86	0.005	0.995	0.85								
		CHVISTM	-0.2109	0.3057	-0.69	0.491	0.509	0.85								
IR40	Try MIMPNQDV	CONST	-0.6060	0.6811	-0.89	0.374	0.626	0.85	IR 15	324.132	316.398	7.734	1	0.995	0.90	Accept MIMPNQDV.
		CDREBQQ	0.0375	0.0102	3.66	0.000	1.000	0.85								
		CMVISSX	-0.7282	0.2922	-2.49	0.013	0.987	0.85								
		CMVISAG	-0.0224	0.0099	-2.28	0.023	0.977	0.85								
		CMNUMCHD	-0.8212	0.2903	-2.83	0.005	0.995	0.85								
		CMIMPNQD	0.5601	0.3420	1.64	0.102	0.898	0.85								
IR41	Try MIMPSCDV	CONST	-1.3987	0.9037	-1.55	0.123	0.877	0.85	IR40	316.398	314.000	2.398	1	0.879	0.90	Reject MIMPSCDV.
		CDREBQQ	0.0376	0.0103	3.66	0.000	1.000	0.85								
		CMVISSX	-0.7284	0.2913	-2.50	0.013	0.987	0.85								
		CMVISAG	-0.0225	0.0099	-2.27	0.024	0.976	0.85								
		CMNUMCHD	-0.7757	0.2914	-2.66	0.008	0.992	0.85								
		CMIMPNQD	0.4402	0.3499	1.26	0.209	0.791	0.85								
		CMIMPSCD	0.9273	0.6558	1.41	0.158	0.842	0.85								
IR42	Try MIMPHCDV	CONST	-0.5944	0.6833	-0.87	0.385	0.615	0.85	IR40	316.398	316.309	0.089	1	0.235	0.90	Reject MIMPHCDV.
		CDREBQQ	0.0375	0.0103	3.66	0.000	1.000	0.85								
		CMVISSX	-0.7136	0.2966	-2.41	0.017	0.983	0.85								
		CMVISAG	-0.0221	0.0099	-2.23	0.026	0.974	0.85								
		CMNUMCHD	-0.8168	0.2910	-2.81	0.005	0.995	0.85								
		CMIMPNQD	0.5740	0.3458	1.66	0.098	0.902	0.85								
		CMIMPHCD	-0.0893	0.3008	-0.30	0.767	0.233	0.85								
IR43	Try DSLMAX	CONST	-0.5303	1.2417	-0.43	0.670	0.330	0.85	IR40	316.398	316.393	0.005	1	0.056	0.90	Reject DSLMAX.
		CDREBQQ	0.0392	0.0260	1.51	0.133	0.867	0.85								
		CMVISSX	-0.7294	0.2918	-2.50	0.013	0.987	0.85								
		CMVISAG	-0.0225	0.0099	-2.28	0.023	0.977	0.85								
		CMNUMCHD	-0.8192	0.2912	-2.81	0.005	0.995	0.85								
		CMIMPNQD	0.5592	0.3427	1.63	0.104	0.896	0.85								
		CDSLMAX	-0.0018	0.0250	-0.07	0.942	0.058	0.85								
IR44	Try Top	TOP	0.4711	?					IR40	316.398	315.396	1.002	1	0.683	0.90	Reject Top.
		CONST	0.4799	?												
		CDREBQQ	0.0559	?												
		CMVISSX	-1.0732	?												
		CMVISAG	-0.0331	?												
		CMNUMCHD	-1.0604	?												
		CMIMPNQD	0.7328	?												

		Individual coefficients and their statistics							The entire model and its statistics							
			From Statistica				Calculated	Criterion	Reference		From Statistica	Calculated			Criterion	
Model	Purpose	Param	Value	Std. Err.	Stud. t	p	1 - p	1 - p	Model	- 2LogLike	- 2LogLike	G	Del df	1 - p	1 - p	Conclusions about this model
IR45	Try	CONST	-0.9822	0.7819	-1.26	0.210	0.790	0.85	IR40	316.398	312.718	3.680	3	0.702	0.90	Reject Specific interviewer.
	Specific	CDREBQQ	0.0373	0.0105	3.57	0.000	1.000	0.85								
	interviewer	CMVISSX	-0.6504	0.2952	-2.20	0.028	0.972	0.85								
		CMVISAG	-0.0209	0.0101	-2.06	0.040	0.960	0.85								
		CMNUMCHD	-0.7839	0.2927	-2.68	0.008	0.992	0.85								
		CMIMPNQD	0.5745	0.3454	1.66	0.097	0.903	0.85								
		CHINT2	-0.0164	0.4441	-0.04	0.971	0.029	0.85								
		CHINT3	0.5143	0.3370	1.53	0.128	0.872	0.85								
		CHINT4	-0.1423	0.5154	-0.28	0.783	0.217	0.85								
IR46	Try	CONST	33.6074	?					IR40	316.398	298.203	18.195	9	0.967	0.90	Reject Specific date.
	Specific date	CDREBQQ	0.0383	?												
		CMVISSX	-0.9041	?												
		CMVISAG	-0.0140	?												
		CMNUMCHD	-1.0035	?												
		CMIMPNQD	0.5412	?												
		C15	-34.0334	?												
		C16	-33.9789	?												
		C17	-35.6168	?												
		C18	-34.5823	?												
		C21	-34.5840	?												
		C22	-33.8959	?												
		C23	-34.2161	?												
		C24	-33.7650	?												
		C25	-33.9310	?												
IR47	Jackknife 1	CONST	-0.5669	0.6812	-0.83	0.406	0.594	0.85			310.628					To compute standard errors. HDT14 excluded. All convergences sought with Quasi-Newton Method.
		CDREBQQ	0.0363	0.0102	3.54	0.000	1.000	0.85								
		CMVISSX	-0.7639	0.2969	-2.64	0.009	0.991	0.85								
		CMVISAG	-0.0201	0.0099	-2.03	0.043	0.957	0.85								
		CMNUMCHD	-0.8453	0.2927	-2.89	0.004	0.996	0.85								
		CMIMPNQD	0.5241	0.3412	1.54	0.126	0.874	0.85								
IR48	Jackknife 2	CONST	-1.0162	0.7258	-1.40	0.163	0.837	0.85			285.563					To compute standard errors. HDT15 excluded.
		CDREBQQ	0.0396	0.0107	3.69	0.000	1.000	0.85								
		CMVISSX	-0.6512	0.3039	-2.14	0.033	0.967	0.85								
		CMVISAG	-0.0181	0.0102	-1.78	0.076	0.924	0.85								
		CMNUMCHD	-0.8845	0.3091	-2.86	0.005	0.995	0.85								
		CMIMPNQD	0.6409	0.3642	1.76	0.080	0.920	0.85								
IR49	Jackknife 3	CONST	-0.9283	0.7382	-1.26	0.210	0.790	0.85			286.926					To compute standard errors. HDT16 excluded.
		CDREBQQ	0.0398	0.0108	3.68	0.000	1.000	0.85								
		CMVISSX	-0.7170	0.3059	-2.34	0.020	0.980	0.85								
		CMVISAG	-0.0197	0.0101	-1.95	0.052	0.948	0.85								
		CMNUMCHD	-0.6709	0.3019	-2.22	0.027	0.973	0.85								
		CMIMPNQD	0.5952	0.3712	1.60	0.110	0.890	0.85								
IR50	Jackknife 4	CONST	-0.1843	0.7247	-0.25	0.799	0.201	0.85			282.282					To compute standard errors. HDT17 excluded.
		CDREBQQ	0.0378	0.0109	3.48	0.001	0.999	0.85								
		CMVISSX	-0.9024	0.3134	-2.88	0.004	0.996	0.85								
		CMVISAG	-0.0204	0.0106	-1.92	0.056	0.944	0.85								
		CMNUMCHD	-0.8943	0.3085	-2.90	0.004	0.996	0.85								
		CMIMPNQD	0.4403	0.3600	1.22	0.222	0.778	0.85								
IR51	Jackknife 5	CONST	-0.6365	0.6999	-0.91	0.364	0.636	0.85			298.313					To compute standard errors. HDT18 excluded.
		CDREBQQ	0.0397	0.0109	3.63	0.000	1.000	0.85								
		CMVISSX	-0.7684	0.3031	-2.54	0.012	0.988	0.85								
		CMVISAG	-0.0230	0.0101	-2.27	0.024	0.976	0.85								
		CMNUMCHD	-0.7390	0.2977	-2.48	0.014	0.986	0.85								
		CMIMPNQD	0.5734	0.3543	1.62	0.107	0.893	0.85								
IR52	Jackknife 6	CONST	-0.4959	0.7205	-0.69	0.492	0.508	0.85			267.522					To compute standard errors. HDT21 excluded.
		CDREBQQ	0.0337	0.0106	3.18	0.002	0.998	0.85								
		CMVISSX	-0.6544	0.3146	-2.08	0.038	0.962	0.85								
		CMVISAG	-0.0236	0.0112	-2.12	0.035	0.965	0.85								
		CMNUMCHD	-0.9354	0.3186	-2.94	0.004	0.996	0.85								
		CMIMPNQD	0.6490	0.3679	1.76	0.079	0.921	0.85								

Interference with Natural Quiet vs. Relative Sound Level (Aircraft Leq minus Background Leq)

23 Feb 98 - 11 Mar 98

294470.03 White Sands Regression History

Model	Purpose	Param	Individual coefficients and their statistics: From Statistica: Value	Std. Err.	Stud. t	p	Calculated 1 - p	Criterion 1 - p	The entire model and its statistics: Reference Model	Reference - 2LogLike	From Statistica - 2LogLike	Calculated G	Del df	1 - p	Criterion 1 - p	Conclusions about this model
IR53	Jackknife 7	CONST	-0.7323	0.7929	-0.92	0.357	0.643	0.85			259.598					To compute standard errors. HDT22 excluded.
		CDREBQQ	0.0405	0.0115	3.52	0.001	0.999	0.85								
		CMVISSX	-0.7391	0.3189	-2.32	0.021	0.979	0.85								
		CMVISAG	-0.0255	0.0108	-2.35	0.020	0.980	0.85								
		CMNUMCHD	-0.7816	0.3193	-2.45	0.015	0.985	0.85								
		CMIMPNQD	0.6534	0.3873	1.69	0.093	0.907	0.85								
IR54	Jackknife 8	CONST	-0.5283	0.7237	-0.73	0.466	0.534	0.85			287.493					To compute standard errors. HDT23 excluded.
		CDREBQQ	0.0355	0.0111	3.21	0.001	0.999	0.85								
		CMVISSX	-0.7192	0.3068	-2.34	0.020	0.980	0.85								
		CMVISAG	-0.0230	0.0102	-2.25	0.025	0.975	0.85								
		CMNUMCHD	-0.8042	0.3019	-2.66	0.008	0.992	0.85								
		CMIMPNQD	0.5540	0.3580	1.55	0.123	0.877	0.85								
IR55	Jackknife 9	CONST	-0.5403	0.7111	-0.76	0.448	0.552	0.85			277.615					To compute standard errors. HDT24 excluded.
		CDREBQQ	0.0372	0.0109	3.42	0.001	0.999	0.85								
		CMVISSX	-0.6399	0.3147	-2.03	0.043	0.957	0.85								
		CMVISAG	-0.0285	0.0109	-2.61	0.010	0.990	0.85								
		CMNUMCHD	-0.7211	0.3107	-2.32	0.021	0.979	0.85								
		CMIMPNQD	0.4902	0.3591	1.37	0.173	0.827	0.85								
IR56	Jackknife 10	CONST	-0.5160	0.6989	-0.74	0.461	0.539	0.85			287.059					To compute standard errors. HDT25 excluded.
		CDREBQQ	0.0354	0.0107	3.30	0.001	0.999	0.85								
		CMVISSX	-0.6965	0.3067	-2.27	0.024	0.976	0.85								
		CMVISAG	-0.0222	0.0103	-2.15	0.032	0.968	0.85								
		CMNUMCHD	-0.9746	0.3109	-3.13	0.002	0.998	0.85								
		CMIMPNQD	0.5123	0.3563	1.44	0.152	0.848	0.85								
PICK UP AGAIN HERE, AFTER CHANGING DEFINITION OF DREBQQ.																
IR57	Null case	CONST	-1.0618	0.1376	-7.71	0.000	1.000	0.85	----------	----------	368.129	----------	----------	----------	----------	Null case.
IR58	Try DREBQQ	CONST	-2.1953	0.3559	-6.17	0.000	1.000	0.85	IR57	368.129	346.863	21.266	1	1.000	0.90	Accept DREBQQ.
		CDREBQQ	0.0364	0.0093	3.92	0.000	1.000	0.85								
IR59	Try OVERHD	CONST	-2.4838	0.4851	-5.12	0.000	1.000	0.85	IR58	346.863	345.409	1.454	1	0.772	0.90	Reject OVERHD.
		CDREBQQ	0.0267	0.0122	2.19	0.029	0.971	0.85								
		COVERHD	0.6949	0.6098	1.14	0.255	0.745	0.85								
IR60	Try INFOYN	CONST	-2.1266	0.3779	-5.63	0.000	1.000	0.85	IR58	346.863	346.566	0.297	1	0.414	0.90	Reject INFOYN.
		CDREBQQ	0.0363	0.0092	3.92	0.000	1.000	0.85								
		CINFOYN	-0.1438	0.2754	-0.52	0.602	0.398	0.85								
IR61	Try DACTIML	CONST	-2.0472	0.7687	-2.66	0.008	0.992	0.85	IR58	346.863	346.080	0.783	1	0.624	0.90	Reject DACTIML.
		CDREBQQ	0.0379	0.0112	3.38	0.001	0.999	0.85								
		CDACTIML	-0.1300	0.5785	-0.22	0.822	0.178	0.85								
IR62	Try MVISSX	CONST	-1.0849	0.5070	-2.14	0.033	0.967	0.85	IR58	346.863	337.099	9.764	1	0.998	0.90	Accept MVISSX.
		CDREBQQ	0.0377	0.0093	4.05	0.000	1.000	0.85								
		CMVISSX	-0.8045	0.2896	-2.78	0.006	0.994	0.85								
IR63	Try MVISAG	CONST	-0.2362	0.6069	-0.39	0.697	0.303	0.85	IR62	337.099	328.260	8.839	1	0.997	0.90	Accept MVISAG.
		CDREBQQ	0.0373	0.0092	4.03	0.000	1.000	0.85								
		CMVISSX	-0.7312	0.2924	-2.50	0.013	0.987	0.85								
		CMVISAG	-0.0250	0.0102	-2.45	0.015	0.985	0.85								
IR64	Try MFRST	CONST	-0.3302	0.7800	-0.42	0.672	0.328	0.85	IR63	328.260	328.221	0.039	1	0.157	0.90	Reject MFRST.
		CDREBQQ	0.0372	0.0093	4.02	0.000	1.000	0.85								
		CMVISSX	-0.7335	0.2928	-2.50	0.013	0.987	0.85								
		CMVISAG	-0.0249	0.0102	-2.43	0.016	0.984	0.85								
		CMFRST	0.1000	0.5199	0.19	0.848	0.152	0.85								
IR65	Try MNUMCHD1	CONST	0.0301	0.6055	0.05	0.960	0.040	0.85	IR63	328.260	318.711	9.549	1	0.998	0.90	Accept MNUMCHD1.
		CDREBQQ	0.0352	0.0092	3.83	0.000	1.000	0.85								
		CMVISSX	-0.6937	0.2910	-2.38	0.018	0.982	0.85								
		CMVISAG	-0.0220	0.0098	-2.23	0.026	0.974	0.85								
		CMNUMCHD	-0.8683	0.2898	-3.00	0.003	0.997	0.85								
IR66	Try MNUMADD3	CONST	0.1223	0.6414	0.19	0.849	0.151	0.85	IR65	318.711	318.503	0.208	1	0.352	0.90	Reject MNUMADD3.
		CDREBQQ	0.0349	0.0092	3.80	0.000	1.000	0.85								
		CMVISSX	-0.6993	0.2923	-2.39	0.017	0.983	0.85								
		CMVISAG	-0.0229	0.0102	-2.25	0.025	0.975	0.85								
		CMNUMCHD	-0.8464	0.2941	-2.88	0.004	0.996	0.85								
		CMNUMADD	-0.1364	0.3028	-0.45	0.653	0.347	0.85								

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		Individual coefficients and their statistics							The entire model and its statistics							
			From Statistica				Calculated	Criterion	Reference		From Statistica	Calculated			Criterion	
Model	Purpose	Param	Value	Std. Err.	Stud. t	p	1 - p	1 - p	Model	- 2LogLike	- 2LogLike	G	Del df	1 - p	1 - p	Conclusions about this model
IR67	Try DNUMHRL	CONST	0.4012	0.7615	0.53	0.599	0.401	0.85	IR65	318.711	318.012	0.699	1	0.597	0.90	Reject DNUMHRL.
		CDREBQQ	0.0358	0.0092	3.88	0.000	1.000	0.85								
		CMVISSX	-0.6892	0.2976	-2.32	0.021	0.979	0.85								
		CMVISAG	-0.0222	0.0100	-2.21	0.028	0.972	0.85								
		CMNUMCHD	-0.8645	0.2922	-2.96	0.003	0.997	0.85								
		CDNUMHRL	-0.3674	0.4475	-0.82	0.412	0.588	0.85								
IR68	Try HVISTM	CONST	0.3111	0.8160	0.38	0.703	0.297	0.85	IR65	318.711	318.440	0.271	1	0.397	0.90	Reject HVISTM.
		CDREBQQ	0.0342	0.0093	3.67	0.000	1.000	0.85								
		CMVISSX	-0.7009	0.2922	-2.40	0.017	0.983	0.85								
		CMVISAG	-0.0228	0.0100	-2.28	0.023	0.977	0.85								
		CMNUMCHD	-0.8634	0.2903	-2.97	0.003	0.997	0.85								
		CHVISTM	-0.1570	0.3057	-0.51	0.608	0.392	0.85								
IR69	Try MIMPNQDV	CONST	-0.3199	0.6438	-0.50	0.620	0.380	0.85	IR65	318.711	315.933	2.778	1	0.904	0.90	Accept MIMPNQDV.
		CDREBQQ	0.0341	0.0092	3.69	0.000	1.000	0.85								
		CMVISSX	-0.7265	0.2925	-2.48	0.014	0.986	0.85								
		CMVISAG	-0.0219	0.0098	-2.23	0.026	0.974	0.85								
		CMNUMCHD	-0.8469	0.2901	-2.92	0.004	0.996	0.85								
		CMIMPNQD	0.5535	0.3410	1.62	0.106	0.894	0.85								
IR70	Try MIMPSCDV	CONST	-1.1077	0.8706	-1.27	0.204	0.796	0.85	IR69	315.933	313.557	2.376	1	0.877	0.90	Reject MIMPSCDV.
		CDREBQQ	0.0342	0.0092	3.70	0.000	1.000	0.85								
		CMVISSX	-0.7270	0.2917	-2.49	0.013	0.987	0.85								
		CMVISAG	-0.0219	0.0099	-2.22	0.027	0.973	0.85								
		CMNUMCHD	-0.8004	0.2913	-2.75	0.006	0.994	0.85								
		CMIMPNQD	0.4348	0.3490	1.25	0.214	0.786	0.85								
		CMIMPSCD	0.9233	0.6541	1.41	0.159	0.841	0.85								
IR71	Try MIMPHCDV	CONST	-0.3082	0.6461	-0.48	0.634	0.366	0.85	IR69	315.933	315.849	0.084	1	0.228	0.90	Reject MIMPHCDV.
		CDREBQQ	0.0341	0.0092	3.69	0.000	1.000	0.85								
		CMVISSX	-0.7121	0.2969	-2.40	0.017	0.983	0.85								
		CMVISAG	-0.0216	0.0099	-2.18	0.030	0.970	0.85								
		CMNUMCHD	-0.8429	0.2908	-2.90	0.004	0.996	0.85								
		CMIMPNQD	0.5670	0.3448	1.64	0.101	0.899	0.85								
		CMIMPHCD	-0.0871	0.3012	-0.29	0.773	0.227	0.85								
IR72	Try DSLMAX	CONST	-0.3168	1.2739	-0.25	0.804	0.196	0.85	IR69	315.933	315.933	0.000	1	0.000	0.90	Reject DSLMAX.
		CDREBQQ	0.0341	0.0207	1.65	0.099	0.901	0.85								
		CMVISSX	-0.7265	0.2926	-2.48	0.014	0.986	0.85								
		CMVISAG	-0.0219	0.0098	-2.23	0.026	0.974	0.85								
		CMNUMCHD	-0.8469	0.2904	-2.92	0.004	0.996	0.85								
		CMIMPNQD	0.5534	0.3418	1.62	0.106	0.894	0.85								
		CDSLMAX	-0.0001	0.0221	-0.00	0.998	0.002	0.85								
IR73	Try Specific interviewer	CONST	-0.7211	0.7448	-0.97	0.334	0.666	0.85	IR69	315.933	312.051	3.882	3	0.726	0.90	Specific interviewer not important.
		CDREBQQ	0.0343	0.0094	3.63	0.000	1.000	0.85								
		CMVISSX	-0.6478	0.2955	-2.19	0.029	0.971	0.85								
		CMVISAG	-0.0202	0.0101	-2.00	0.047	0.953	0.85								
		CMNUMCHD	-0.8122	0.2924	-2.78	0.006	0.994	0.85								
		CMIMPNQD	0.5659	0.3444	1.64	0.101	0.899	0.85								
		CHINT2	-0.0261	0.4438	-0.06	0.953	0.047	0.85								
		CHINT3	0.5341	0.3370	1.59	0.114	0.886	0.85								
		CHINT4	-0.1176	0.5175	-0.23	0.820	0.180	0.85								
IR74	Try Specific date	CONST	25.1803	?					IR69	315.933	298.244	17.689	9	0.961	0.90	Specific date confounds with other coefficients. If it is important, its effect will be found during jackknifing.
		CDREBQQ	0.0338	?												
		CMVISSX	-0.9019	?												
		CMVISAG	-0.0138	?												
		CMNUMCHD	-1.0277	?												
		CMIMPNQD	0.5388	?												
		C15	-25.3380	?												
		C16	-25.2536	?												
		C17	-26.8507	?												
		C18	-25.7644	?												
		C21	-25.7776	?												
		C22	-25.1367	?												
		C23	-25.4890	?												
		C24	-25.0266	?												
		C25	-25.1185	?												

Interference with Natural Quiet vs. Relative Sound Level (Aircraft Leq minus Background Leq)

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			Individual coefficients and their statistics						The entire model and its statistics							
			From Statistica				Calculated	Criterion	Reference		From Statistica	Calculated			Criterion	
Model	Purpose	Param	Value	Std. Err.	Stud. t	p	1 - p	1 - p	Model	- 2LogLike	- 2LogLike	G	Del df	1 - p	1 - p	Conclusions about this model
IR75	Jackknife 1	CONST	-0.2904	0.6445	-0.45	0.653	0.347	0.85			310.196					To compute standard errors. HDT14 excluded. All convergences sought with Quasi-Newton Method.
		CDREBQQ	0.0330	0.0092	3.58	0.000	1.000	0.85								
		CMVISSX	-0.7820	0.2971	-2.63	0.009	0.991	0.85								
		CMVISAG	-0.0196	0.0098	-1.99	0.048	0.952	0.85								
		CMNUMCHD	-0.8697	0.2926	-2.97	0.003	0.997	0.85								
		CMIMPNQD	0.5179	0.3403	1.52	0.129	0.871	0.85								
IR76	Jackknife 2	CONST	-0.6803	0.6814	-1.00	0.319	0.681	0.85			285.543					To compute standard errors. HDT15 excluded.
		CDREBQQ	0.0354	0.0096	3.69	0.000	1.000	0.85								
		CMVISSX	-0.6498	0.3041	-2.14	0.033	0.967	0.85								
		CMVISAG	-0.0177	0.0101	-1.74	0.082	0.918	0.85								
		CMNUMCHD	-0.9098	0.3089	-2.94	0.003	0.997	0.85								
		CMIMPNQD	0.6321	0.3630	1.74	0.083	0.917	0.85								
IR77	Jackknife 3	CONST	-0.6270	0.6953	-0.90	0.368	0.632	0.85			286.219					To compute standard errors. HDT16 excluded.
		CDREBQQ	0.0366	0.0098	3.74	0.000	1.000	0.85								
		CMVISSX	-0.7171	0.3059	-2.34	0.020	0.980	0.85								
		CMVISAG	-0.0190	0.0100	-1.89	0.059	0.941	0.85								
		CMNUMCHD	-0.6993	0.3012	-2.32	0.021	0.979	0.85								
		CMIMPNQD	0.5824	0.3698	1.57	0.116	0.884	0.85								
IR78	Jackknife 4	CONST	0.0985	0.6877	0.14	0.886	0.114	0.85			281.686					To compute standard errors. HDT17 excluded.
		CDREBQQ	0.0343	0.0097	3.53	0.000	1.000	0.85								
		CMVISSX	-0.8976	0.3137	-2.86	0.005	0.995	0.85								
		CMVISAG	-0.0198	0.0106	-1.87	0.062	0.938	0.85								
		CMNUMCHD	-0.9220	0.3085	-2.99	0.003	0.997	0.85								
		CMIMPNQD	0.4439	0.3593	1.24	0.218	0.782	0.85								
IR79	Jackknife 5	CONST	-0.3379	0.6620	-0.51	0.610	0.390	0.85			297.814					To compute standard errors. HDT18 excluded.
		CDREBQQ	0.0363	0.0099	3.68	0.000	1.000	0.85								
		CMVISSX	-0.7701	0.3036	-2.54	0.012	0.988	0.85								
		CMVISAG	-0.0224	0.0101	-2.23	0.027	0.973	0.85								
		CMNUMCHD	-0.7648	0.2977	-2.57	0.011	0.989	0.85								
		CMIMPNQD	0.5646	0.3534	1.60	0.111	0.889	0.85								
IR80	Jackknife 6	CONST	-0.2623	0.6864	-0.38	0.703	0.297	0.85			267.033					To compute standard errors. HDT21 excluded.
		CDREBQQ	0.0310	0.0096	3.22	0.001	0.999	0.85								
		CMVISSX	-0.6516	0.3147	-2.07	0.039	0.961	0.85								
		CMVISAG	-0.0229	0.0111	-2.06	0.040	0.960	0.85								
		CMNUMCHD	-0.9506	0.3181	-2.99	0.003	0.997	0.85								
		CMIMPNQD	0.6368	0.3670	1.74	0.084	0.916	0.85								
IR81	Jackknife 7	CONST	-0.4578	0.7479	-0.61	0.541	0.459	0.85			258.512					To compute standard errors. HDT22 excluded.
		CDREBQQ	0.0376	0.0104	3.63	0.000	1.000	0.85								
		CMVISSX	-0.7364	0.3194	-2.31	0.022	0.978	0.85								
		CMVISAG	-0.0249	0.0108	-2.30	0.022	0.978	0.85								
		CMNUMCHD	-0.8068	0.3194	-2.53	0.012	0.988	0.85								
		CMIMPNQD	0.6505	0.3857	1.69	0.093	0.907	0.85								
IR82	Jackknife 8	CONST	-0.2449	0.6805	-0.36	0.719	0.281	0.85			287.205					To compute standard errors. HDT23 excluded.
		CDREBQQ	0.0322	0.0100	3.23	0.001	0.999	0.85								
		CMVISSX	-0.7192	0.3070	-2.34	0.020	0.980	0.85								
		CMVISAG	-0.0226	0.0102	-2.22	0.027	0.973	0.85								
		CMNUMCHD	-0.8344	0.3017	-2.77	0.006	0.994	0.85								
		CMIMPNQD	0.5510	0.3571	1.54	0.124	0.876	0.85								
IR83	Jackknife 9	CONST	-0.2592	0.6727	-0.39	0.700	0.300	0.85			277.239					To compute standard errors. HDT24 excluded.
		CDREBQQ	0.0340	0.0098	3.45	0.001	0.999	0.85								
		CMVISSX	-0.6341	0.3148	-2.01	0.045	0.955	0.85								
		CMVISAG	-0.0280	0.0109	-2.57	0.011	0.989	0.85								
		CMNUMCHD	-0.7549	0.3106	-2.43	0.016	0.984	0.85								
		CMIMPNQD	0.4833	0.3582	1.35	0.178	0.822	0.85								

APPENDIX F - SUMMARY OF REJECTED MEDIATORS

Appendix F. SUMMARY OF REJECTED MEDIATORS

This appendix tabulates those mediator variables that were rejected, separately for each of the four final dose-response relationships. In brief, we rejected mediators if we were less than 90 percent certain that they affected visitor response—more technically, if the regression's G statistic, relative to the previous nested model, was less than 0.90 (see footnotes in Appendix B for further discussion of the G statistic.)

Tables F.1 through F.4 tabulate all rejected variables and give specific reasons for each rejection.

In these tables, most percentage values (from the G statistics) argue clearly for rejection: they are far less than 90 percent. However, several of them are very close, in the upper 80 percents, for example. During regression, we went quite strictly by the rejection rules and rejected these "close calls." However, to point them out as "possibly" influential, we have tabulated them in italic type within the tables here.

Table F.1. Insufficiently significant factors: Annoyance vs. Percent Time Aircraft Audible

Factor	Reason not included in the dose-response relationship
Aircraft grouping	
Grouping together of aircraft flights (first method)[1]	Only 64% certain that "aircraft grouping," when determined in this manner, affects response. In addition, because "number of audible aircraft events" correlates strongly with "percent time aircraft audible," neither effect can be adequately determined with both of them in the regression equation.[3]
Grouping together of aircraft flights (second method)[2]	Only 79% certain that "aircraft grouping," when determined in this manner, affects response. In addition, because "aircraft L_{eq}" correlates strongly with "percent time aircraft audible," neither effect can be adequately determined with both of them in the regression equation.[3]
Other aircraft factors	
Overhead flights or not	Only 76% certain that "overhead flights or not" affects response. In addition, because "overhead flights or not" correlates strongly with "percent time aircraft audible," neither effect can be adequately determined with both of them in the regression equation.[3]
Closest-aircraft distance (any effect beyond dose, alone?)	Because "closest-aircraft distance" correlates strongly with "percent time aircraft audible," neither effect can be adequately determined with both of them in the regression equation.[3] More importantly, including "closest-aircraft distance" in the regression would eliminate 23 percent of the visitor data: all those without overhead flights. For this last reason, this variable and the following one were eliminated for the other three dose-response relationships, as well.
Closest-aircraft SEL (any effect beyond dose, alone?)	Same reasons as for "closest-aircraft distance."
Aircraft L_{max} (any effect beyond dose, alone?)	Only 79% certain that "aircraft L_{max}" affects response, beyond the effect of dose, alone.
Visitor factors	
Age	Only 68% certain that "visitor age" affects response.
First visit or not	Only 19% certain that "first visit or not" affects response.
Importance of historical/cultural aspects of site	Only 76% certain that "historical/cultural aspects very important" affects response.
Importance of scenery	Only 17% certain that "scenery very important" affects response.
Number of adults in group	Only 6% certain that "number of adults in group" affects response.
Time of visit (am or pm)	Only 55% certain that "am/pm" affects response.

1 Mathematically, "aircraft grouping" was first determined by combining "number of audible aircraft events" with the dose, "percent time aircraft audible."

2 Then "aircraft grouping" was also determined by combining "aircraft L_{eq}" with the dose, "percent time aircraft audible."

3 Mathematically, the strong correlation produces regression coefficients not necessarily -- less than 85% certainty -- different from zero.

Table F.2. Insufficiently significant factors: Interference with Natural Quiet vs. Percent Time Aircraft Audible

Factor	Reason not included in the dose-response relationship
Information	
Information about aircraft flights in area	Only 22% certain that "information" affects response.
Aircraft grouping	
Grouping together of aircraft flights (first method)[1]	Only 26% certain that "aircraft grouping," when determined in this manner, affects response.
Grouping together of aircraft flights (second method)[2]	Because "aircraft grouping," when determined in this manner, correlates strongly with "percent time aircraft audible," neither effect can be adequately determined with both of them in the regression equation.[3]
Other aircraft factors	
Overhead flights or not	Because "overhead flights or not" correlates strongly with "percentage of time aircraft audible," neither effect can be adequately determined with both of them in the regression equation.[3]
Aircraft L_{max} (any effect beyond dose, alone?)	Because "aircraft L_{max}" correlates strongly with "percent time aircraft audible," neither effect can be adequately determined with both of them in the regression equation.[3]
Visitor factors	
First visit or not	Only 17% certain that "first visit or not" affects response.
Importance of historical/cultural aspects of site	Only 10% certain that "historical/cultural aspects very important" affects response.
Importance of scenery	*Only 89% certain that "scenery very important" affects response. In addition, because "scenery very important" correlates strongly with "Natural Quiet very important," neither effect can be adequately determined with both of them in the regression equation.[3]*
Number of adults in group	Only 75% certain that "number of adults in group" affects response.
Time of visit (am or pm)	Only 58% certain that "am/pm" affects response.

1 Mathematically, "aircraft grouping" was first determined by combining "number of audible aircraft events" with the dose, "percent time aircraft audible."

2 Then "aircraft grouping" was also determined by combining "aircraft L_{eq}" with the dose, "percent time aircraft audible."

3 Mathematically, the strong correlation produces regression coefficients not necessarily -- less than 85% certainty -- different from zero.

Table F.3. Insufficiently significant factors: Annoyance vs. Relative Sound Level (Aircraft L_{eq} minus Background L_{eq})

Factor	Reason not included in the dose-response relationship
Aircraft grouping	
Grouping together of aircraft flights (first method)[1]	*Only 87% certain that "aircraft grouping," when determined in this manner, affects response.*
Grouping together of aircraft flights (second method)[2]	Because "percent time aircraft audible" correlates strongly with "relative sound level," neither effect can be adequately determined with both of them in the regression equation.[3]
Other aircraft factors	
Overhead flights or not	Only 29% certain that "overhead flights or not" affects response.
Aircraft L_{max} (any effect beyond dose, alone?)	Only 26% certain that "aircraft L_{max}" affects response, beyond the effect of dose, alone. In addition, because "aircraft L_{max}" correlates strongly with "relative sound level," neither effect can be adequately determined with both of them in the regression equation.[3]
Visitor factors	
Age	*Only 89% certain that "visitor age" affects response (older means slightly less annoyed).*
First visit or not	Only 43% certain that "first visit or not" affects response.
Importance of historical/cultural aspects of site	Only 80% certain that "historical/cultural aspects very important" affects response.
Importance of scenery	Only 33% certain that "scenery very important" affects response.
Number of adults in group	Only 56% certain that "number of adults in group" affects response.
Time of visit (am or pm)	Only 78% certain that "am/pm" affects response.

1 Mathematically, "aircraft grouping" was first determined by combining "number of audible aircraft events per hour" with the dose, "relative sound level."

2 Then "aircraft grouping" was also determined by combining "percent time aircraft audible" with the dose, "relative sound level."

3 Mathematically, the strong correlation produces regression coefficients not necessarily -- less than 85% certainty -- different from zero.

Table F.4. Insufficiently significant factors: Interference with Natural Quiet vs. Relative Sound Level (Aircraft L_{eq} minus Background L_{eq})

Factor	Reason not included in the dose-response relationship
Information	
Information about aircraft flights in area	Only 41% certain that "information" affects response.
Aircraft grouping	
Grouping together of aircraft flights (first method)[1]	Only 60% certain that "aircraft grouping," when determined in this manner, affects response.
Grouping together of aircraft flights (second method)[2]	Only 62% certain that "aircraft grouping," when determined in this manner, affects response.
Other aircraft factors	
Overhead flights or not	Only 77% certain that "overhead flights or not" affects response, beyond the effect of dose, alone. In addition, because "overhead flights or not" correlates strongly with "relative sound level," neither effect can be adequately determined with both of them in the regression equation.[3]
Aircraft L_{max} (any effect beyond dose, alone?)	Less than 1% certain that "aircraft L_{max}" affects response, beyond the effect of dose, alone.
Visitor factors	
First visit or not	Only 16% certain that "first visit or not" affects response.
Importance of historical/cultural aspects of site	Only 23% certain that "historical/cultural aspects very important" affects response.
Importance of scenery	*Only **88%** certain that "scenery very important" affects response. In addition, because "importance of scenery" correlates strongly with "Natural Quiet very important," neither effect can be adequately determined with both of them in the regression equation.*[3]
Number of adults in group	Only 35% certain that "number of adults in group" affects response.
Time of visit (am or pm)	Only 40% certain that "am/pm" affects response.

1 Mathematically, "aircraft grouping" was first determined by combining "number of audible aircraft events per hour" with the dose, "relative sound level."

2 Then "aircraft grouping" was also determined by combining "percent time aircraft audible" with the dose, "relative sound level."

3 Mathematically, the strong correlation produces regression coefficients not necessarily -- less than 85% certainty -- different from zero.

ATTACHMENT 1

White Sands National Monument

On-Site Visitor Intercept Survey Method

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UNITED STATES AIR FORCE
WHITE SANDS NATIONAL MONUMENT
ON-SITE VISITOR INTERCEPT SURVEY METHODOLOGY

OVERVIEW

During July of 1997, both acoustical noise data and visitor intercept survey data were collected for the United States Air Force to estimate a dose-response relationship between sound from military aircraft overflights and reactions of visitors to White Sands National Monument. This document summarizes data collected with the park visitors to White Sands National Monument in July.

This study builds upon research conducted by the National Park Service to examine the dose-response relationship between sightseeing aircraft overflights and NPS visitor reactions. Because of the different characteristics of sounds from military aircraft, the dose-response relationship for these types of aircraft overflights may be quite different from the relationship developed for sightseeing aircraft overflights.

In July, on-site interviews were administered with visitors as they were leaving Big Dune Trail in White Sands National Monument. The objectives of the visitor intercept surveys were to:

- identify the importance of natural quiet to park visitors
- identify the percentage of visitors who are impacted by aircraft sound
- determine the extent to which aircraft sounds interfere with natural quiet
- identify the specific characteristics of aircraft sound that affect visitor enjoyment
- identify the percentage of visitors who are impacted by aircraft sighting

Concurrent with the on-site interviews, sound recordings of the exposure to aircraft overflights (and other noise sources) were taken so that the specific "noise dose" experienced by each visitor can be matched to the responses provided in the visitor survey.

SITE SELECTION

The sampling plan for conducting the dose-response surveys was based on the notion that data should be collected only at location(s) having a high number of visitors and a high probability of aircraft overflights during typical visitor periods. The estimated cost of data collection and analysis per park is high enough that all efforts at sampling sites must be directed at insuring useful data will be acquired. In terms of a dose-response study, we defined "useful" data as 200 to 300 interviews per site with visitors who have experienced a range of overflight exposure while at that site.

The actual selection of the site for the visitor intercept/noise measurements (Big Dune Trail) was done after discussions with park staff and on-site observation. First, discussions were held with park staff to identify those trails having enough visitation to yield a sufficient number of completed intercept surveys during a 1 to 2 week data collection time period.

An on-site visit was then made by the researchers to these trails to determine which of the trails were best suited logistically for conducting the intercept surveys and noise measurement. This visit was necessary to insure that aircraft noise dose is measurable and not unduly hindered by non-aircraft sources of noise; that the selected site had a location where noise monitoring equipment can be set up to reasonably measure visitor dose; that locations for measurement equipment are available that will not attract attention and raise visitor curiosity or awareness of noise; and that noise measurement locations are physically suitable for the measurement technician to sit for extended periods (e.g., no irritating fumes or risks to safety). The potential sites were also examined for suitability to conduct the visitor intercept survey--that is, visitors' arrival must be observable by the interviewers; visitors must be away from cars long enough to hear or see an overflight; interviewers must be able to see visitors returning to their cars in time to intercept them before they enter the car; and there must be locations to safely conduct a group interview without undue interruption of other visitors' experiences.

SAMPLE PLAN

The sample design called for collecting information from a representative sample of visitors to Big Dune Trail during the dates of July 14-18 and July 21-25, 1997. Data collection was not conducted on Saturdays or Sundays (July 19-20 and July 26-27) because regular aircraft operations from Holloman AFB were not conducted on those days.

The final survey population was restricted in the following ways:

1. Visitors without a permanent U.S. mailing address were excluded from the study.
2. Visitors younger than 16 years of age were excluded from the study.
3. Non-English speaking visitors were excluded from the study.
4. Visitors leaving the park before or after the sampling period (typically the heaviest 6-hour use period of the day) were excluded from the study.
5. Visitors who had been on the trail less than 10 minutes were excluded from the study.
6. Visitors arriving in tour buses were excluded from the study.

VISITOR INTERCEPT SURVEY PROCEDURES

Visitor Intercept Survey Instrument

The visitor survey consisted of 1~~6~~5 questions that collected the following information: past visitation history, enjoyment of trip, reported exposure to aircraft overflights, evaluation of reported exposure to aircraft overflights, importance of natural quiet and natural scenery, and some visitor characteristics including gender, year of birth, and state of residence. A copy of the visitor intercept survey instrument can be found in Appendix A.

One of the goals of the study was to determine whether specific management actions could significantly reduce or mitigate adverse visitor reactions to overflights. One mitigation procedure tested in this study was to provide visitors with information about overflights. Because signing is used in parks to convey information and it is relatively inexpensive to implement, a single sign, posted at the entrance to the Big Dune Trail, was selected as the method to convey aircraft overflight information. The sign was posted for approximately one-half the data collection period and the sign treatment (up or down) was recorded on each completed visitor intercept survey. The wording of the sign was as follows:

> "Military aircraft can regularly be seen and heard on this walk"

Pretest

Cognitive interviews were completed with visitors to Big Dune Trail over a 3-day period in May, 1997. The results of the cognitive interviews are presented in a separate report. The primary objective of the pretest were to test respondents' interpretation of key survey questions. Based on this pretest, minor revisions were made to the survey instrument.

Visitor Intercept Survey Data Collection Procedures

Field staff monitored groups of visitors as they arrived at Big Dune Trail. For each group, the field staff recorded the exact time at which members of the group entered and departed the Big Dune Trail and the time of the interview. A precise accounting of these times was required to calculate the aircraft noise dose experienced by visitors and to support the analysis of the dose-response relationship. A copy of the observation form used to monitor visitor arrivals is contained in Appendix C.

As each group was leaving the trail, they were intercepted by field staff. If a group of visitors did not visit the Big Dune Trail for at least 10 minutes, the group was not eligible for the dose-response survey. Each group of visitors who had been on the trail for at least 10 minutes were screened for eligibility. To be eligible, a visitor had to be 16 years of age or older and had to be a U.S. citizen. Age and purpose of visit were determined by the field person when intercepting each group. Visitors' ability to speak the English language was also assessed by the field person during this screening process. If the field person felt that any of the visitors in a group would not be able to understand the exit questionnaire, that visitor was not asked to complete it.

A brief questionnaire was administered to <u>all</u> eligible visitors in each group. Each eligible visitor was given a clipboard and answer sheet (contained in Appendix B). The field person then read each question and asked visitors to record their answers on the answer sheet individually.

As the respondents were completing the final few demographic questions, field staff recorded the observational data for the group on the group data sheet. The group data sheet, along with the answer sheets for each of the respondents in the group were fastened together at the completion of the group interview so that group membership could be an analysis variable, if desired. Knowing the members of a specific group enables us to examine the responses of group members for independence, as well as consistency in self-reports of the aircraft overflight exposure they experienced at the site. A copy of the group data sheet can be found in Appendix D.

Table 1 summarizes the status of the visitor intercept survey. A more complete summary is contained in Appendix E.

Table 1: Status of Visitor Intercept Survey Questionnaire

Disposition	
Number of groups visiting site	555
Number of groups that were ineligible[1]	361
Total number of eligible groups contacted	**194**
Number of eligible groups missed	1
Number of eligible groups refusing to participate	8
Number of eligible groups with language barrier	1
Number of eligible groups completing survey	**184**
Percent of eligible groups completing survey	**94.8%**
Number of adults in eligible groups completing a survey	**380**

1 Ineligible groups include: never entered the Big Dune Trail during the data collection period, were not at the trail for a minimum of 10 minutes, were not a U.S. Citizen, or did not understand English well enough to complete the survey.

FINDINGS FOR THE VISITOR INTERCEPT SURVEY

The visitor intercept survey data is summarized below for all visitors interviewed (those who received the "sign" treatment and those who did not).

Visitor Characteristics

Table 2 presents the age and gender of surveyed visitors, and Table 3 presents their state of residence.

Table 2. Characteristics of Surveyed Visitors

Respondent Characteristics	**Percent of Eligible Respondents**
Age of Respondent[1]	
16-25 years	20.8%
26-35 years	22.1
36-45 years	27.6
46-55 years	16.8
56-65 years	6.6
66 years or more	6.1
Total	*100.0%*
Gender of Respondent	
Male	51.5%
Female	48.5
Total	*100.0%*

[1] Respondents were asked to report the year they were born. Age was extrapolated from that information.

Table 3. State of Residence of Surveyed Visitors

Home State	Percent of Eligible Respondents
Texas	28.9%
New Mexico	8.0
California	6.9
Arizona	6.1
Florida	5.6
New Jersey	3.7
Pennsylvania	3.4
Ohio	2.7
Wisconsin	2.4
Illinois	2.4
Arkansas	2.1
Minnesota	1.9
New York	1.9
Virginia	1.9
Georgia	1.6
Maryland	1.6
Michigan	1.6
Alabama	1.3
Colorado	1.3
Indiana	1.3
Kentucky	1.3
Massachusetts	1.3
Tennessee	1.3
Washington	1.3
Connecticut	1.1
Montana	1.1
Kansas	.8
Louisiana	.8
Missouri	.8
Oklahoma	.8
Alaska	.5
Nebraska	.5
Rhode Island	.5
Utah	.5
District of Columbia	.3
North Carolina	.3
Puerto Rico	.3
Total	*100.0%*

Prior and Current Visit Characteristics

Prior and current visit characteristics are displayed in Table 4. These include the number of times respondents have visited White Sands National Monument and the Big Dune Trail in the past 5 years, as well as the importance of several reasons for their current visit.

Table 4. Visit Characteristics

	Percent of Eligible Respondents
Number of Times Visited White Sands National Monument in Past 5 Years (including this trip)	
1 time	81.1%
2 times	11.8
3 times	2.6
4 or more times	4.5
Total	*100.0%*
Number of Times Visited Big Dune Trail in Past 5 Years (including this trip)	
1 time	94.7%
2 times	3.2
3 times	.5
4 or more times	1.6
Total	*100.0%*
Importance of Viewing Natural Scenery in Reason for Visiting Big Dune Trail	
Not at all important	.5%
Slightly important	1.1
Moderately important	7.9
Very important	31.1
Extremely important	59.4
Total	*100.0%*

	Percent of Eligible Respondents
Importance of Enjoying the Natural Quiet and Sounds of Nature in Reason for Visiting Big Dune Trail	
Not at all important	1.6%
Slightly important	6.9
Moderately important	20.1
Very important	34.3
Extremely important	37.2
Total	*100.0%*
Importance of Appreciating the History and Cultural Significance of the Site in Reason for Visiting Big Dune Trail	
Not at all important	2.7%
Slightly important	8.0
Moderately important	24.7
Very important	33.4
Extremely important	31.3
Total	*100.0%*

Overall Enjoyment of Current Visit to Big Dune Trail

Table 5 presents respondents' overall enjoyment with their current visit to Big Dune Trail. It also presents the most frequently cited "likes" and "dislikes" of the visit, including any mentions of aircraft overflights.

Table 5. Overall Enjoyment of Current Visit

	Percent of Eligible Respondents
Overall Enjoyment	
Not at all enjoyable	.3%
Slightly enjoyable	.5
Moderately enjoyable	11.8
Very enjoyable	53.2
Extremely enjoyable	34.2
Total	*100.0%*
What Liked Most About the Visit (most frequently cited)	
Observing/walking in the white sands/dunes	42.7%
Unspoiled quality of area/raw beauty/scenery	30.3
Wildlife/lizards	14.8
Openness/vast view	10.3
Trail guides/clearly marked trails	10.3
Plant life	8.7
Aircraft overflights	1.1
What Liked Least About the Visit (most frequently cited)	
Heat/sun	37.1%
Bugs	3.2
Aircraft overflights	2.4
Need more path guides	2.1

Impact of Hearing Aircraft

Information pertaining to the impact of hearing aircraft is displayed in Table 6. Information in these tables include: the percent of visitors who heard aircraft; annoyance from aircraft noise; interference from aircraft sounds with enjoyment of the site, the appreciation of natural quiet, and appreciation of historical and/or cultural significance of the site.

Table 6. Impact of Hearing Aircraft

	Percent of Eligible Respondents
Percent of Respondents who Reported Hearing Aircraft	77.4%
Reported Annoyance from Aircraft Noise[1]	
Not at all annoyed	78.1%
Slightly annoyed	10.6
Moderately annoyed	7.4
Very annoyed	2.6
Extremely annoyed	1.3
Total	*100.0%*
Extent to Which Aircraft Interfered with Enjoyment of the Site[1]	
Not at all	78.4%
Slightly	10.8
Moderately	7.4
Very much	2.4
Extremely	1.1
Total	*100.0%*
Extent to Which Aircraft Interfered with Appreciation of the Natural Quiet and Sounds of Nature of the Site[1]	
Not at all	60.3%
Slightly	14.3
Moderately	11.9
Very much	7.4
Extremely	6.1
Total	*100.0%*

	Percent of Eligible Respondents
Extent to Which Aircraft Interfered with Appreciation of the Historical and/or Cultural Significance of the Site[1]	
Not at all	83.9%
Slightly	7.4
Moderately	6.1
Very much	1.9
Extremely	.8
Total	*100.0%*

1 Respondents who did not recall hearing aircraft did not answer the questions, but were assumed to be not at all annoyed or bothered.

Impact of Seeing Aircraft

Table 7 displays the results of seeing aircraft. Information in this table includes the percent of respondents who saw aircraft and their reported annoyance with seeing aircraft.

Table 7. Impact of Hearing Aircraft

	Percent of Eligible Respondents
Percent of Respondents who Reported Seeing Aircraft	73.7%
Reported Annoyance from Seeing Aircraft[1]	
Not at all annoyed	84.2%
Slightly annoyed	9.2
Moderately annoyed	3.7
Very annoyed	1.1
Extremely annoyed	1.8
Total	*100.0%*

1 Respondents who did not recall seeing aircraft did not answer the questions, but were assumed to be not at all annoyed.

Type of Aircraft Heard/Seen

Those respondents who had heard or seen aircraft were asked what type of aircraft they primarily saw/heard (Table 8).

Table 8. Type of Aircraft Heard/Seen

	Percent of Eligible Respondents
Primary Type of Aircraft Heard or Seen	
Commercial aircraft	1.7%
Military aircraft	98.3
Total	*100.0%*

Recall Seeing Information About Aircraft

The final question in the survey asked respondents if they remembered seeing or hearing any information about aircraft that might fly over Big Dune Trail (Table 9). In addition to the "sign treatment", information about aircraft overflights was available from other sources, such as highway road signs, information from Holloman AFB, literature in Alamogordo, etc.

Table 9 presents visitor recall of overflight information for both respondents who had the "sign treatment" (the sign was posted at the trail head during their visit) and those who did not.

Table 9. Recall Seeing or Hearing Information About Aircraft Flyovers

	Sign Treatment Respondents	No Sign Treatment Respondents
Recall Seeing/Hearing Any Information About Aircraft Flyovers	58.8%	26.2%

ATTACHMENT 1
APPENDIX A
Visitor Intercept Survey

OMB Approval No: 0701-0143
Expires: 6/30/2000

VISITOR QUESTIONNAIRE

[INTERVIEWER READ THE INTRODUCTION]

Introduction

Hello. My name is *(INTERVIEWER NAME)*. I am helping the National Park Service with a survey of visitors to *(NAME OF PARK)*. The information visitors give us will help managers identify any problems in the park and enable them to better serve you. I would appreciate a few minutes of your time to answer some questions about your visit. Your participation in the survey is voluntary, and your answers are confidential.

[INTERVIEWER SAY: Now I would like to ask you a few questions about your visit.]

If No objection------------> *(CONTINUE)*

If Objection---------------> *(THANK INDIVIDUALS FOR THEIR TIME AND SELECT NEXT ELIGIBLE GROUP)*

Before we get started, I need to determine how long you have been at *(NAME OF SITE)*. It is now *(GIVE EXACT TIME)*. Do you remember what time you arrived at *(NAME OF SITE)*?

1 No------------> About how long have you been at *(NAME OF SITE)*? *(RECORD GROUP CONSENSUS ON GROUP COVER SHEET)*

2 Yes------------> *(RECORD GROUP CONSENSUS ON GROUP COVER SHEET)*

[INTERVIEWER: HAND OUT CLIPBOARDS AND ANSWER SHEETS.]

[**INTERVIEWER SAY:**"Do not discuss the questions or answers until the interview has been completed."]

1. This first question asks about your current visit to *(NAME OF PARK)*. On what day and time did you start your visit to *(NAME OF PARK)*? *(FILL IN BLANK)*

Date: Month ______________________________ **Date** _____________

Time: __________ **a.m./p.m.**

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2. Is this your first visit to *(NAME OF PARK)* or have you visited the park before?

   1 First visit

   2 Visited park before ------------> Including this trip, approximately how many times have you visited *(NAME OF PARK)*?

   ________ **Total times**

3. The remaining questions ask about your visit to *(NAME OF SITE)*. Have you ever been to *(NAME OF SITE)* before? *(CIRCLE ONE NUMBER)*

   1 No

   2 Yes-----------> For those who have been to *(NAME OF SITE)* before, including this time, about how many times have you visited this site in the past 5 years? *(FILL IN BLANK)*

   ________ **Total number of visits in past 5 years**

4. Overall, how enjoyable has your visit been to *(NAME OF SITE)* during this trip? Has your visit been not at all, slightly, moderately, very, or extremely enjoyable? *(CIRCLE ONE NUMBER)*

   1 Not at all enjoyable

   2 Slightly enjoyable

   3 Moderately enjoyable

   4 Very enjoyable

   5 Extremely enjoyable

5. What have you liked most while you were at *(NAME OF SITE)*? *(FILL IN BLANK)*

   ____

   ____

6. What have you liked least while you were at *(NAME OF SITE)*? *(FILL IN BLANK)*

   ____

   ____

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7. How important was each of the following reasons for visiting *(NAME OF SITE)*? Would you say that *(READ EACH REASON)* was not at all important, slightly, moderately, very, or extremely important for your visit. *(CIRCLE ONE NUMBER FOR EACH REASON)*

Would you say that...	**Not at All Important**	**Slightly Important**	**Moderately Important**	**Very Important**	**Extremely Important**
viewing the natural scenery was...	**1**	**2**	**3**	**4**	**5**
enjoying the natural quiet and sounds of nature was...	**1**	**2**	**3**	**4**	**5**
appreciating the history and cultural significance of the site was...	**1**	**2**	**3**	**4**	**5**

[INTERVIEWER SAY: "Next are two groups of questions about hearing and seeing aircraft at *(NAME OF SITE)*. First, I would like to ask some questions about hearing aircraft. Then I will ask about seeing aircraft."]

HEARING AIRCRAFT

8. Did you hear any airplanes, jets, helicopters, or any other aircraft during your visit to *(NAME OF SITE)*? *(CIRCLE ONE NUMBER)*

   1 No

   2 Yes

[INTERVIEWER SAY: "Questions 9 and 10 are only for those of you who heard an aircraft. The rest of you can wait until I read question 11."]

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9. Were you bothered or annoyed by aircraft noise during your visit to *(NAME OF SITE)*? Were you not at all annoyed, slightly annoyed, moderately annoyed, very annoyed, or extremely annoyed by aircraft noise? *(CIRCLE ONE NUMBER)*

   1 Not at all annoyed
   2 Slightly annoyed
   3 Moderately annoyed
   4 Very annoyed
   5 Extremely annoyed

10. How much did the sound from aircraft interfere with each of the following aspects of your visit at *(NAME OF SITE)*? Did the sound from aircraft interfere with your *(READ EACH STATEMENT)* not at all, slightly, moderately, very much, or extremely? *(CIRCLE ONE NUMBER FOR EACH STATEMENT)*

Did the sound from aircraft interfere with your. . .	**Not at All**	**Slightly**	**Moderately**	**Very Much**	**Extremely**
enjoyment of the site	1	2	3	4	5
appreciation of the natural quiet and sounds of nature at the site	1	2	3	4	5
appreciation of the historical and/or cultural significance of the site	1	2	3	4	5

SEEING AIRCRAFT

11. Did you see any airplanes, jets, helicopters, or any other aircraft during your visit to *(NAME OF SITE)*? *(CIRCLE ONE NUMBER)*

   1 No
   2 Yes

[INTERVIEWER SAY: "Question 12 is only for those of you who saw an aircraft."]

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12. For those who did see aircraft, were you bothered or annoyed by seeing aircraft during your visit to *(NAME OF SITE)*? Were you not at all annoyed, slightly annoyed, moderately annoyed, very annoyed, or extremely annoyed by seeing aircraft? *(CIRCLE ONE NUMBER)*

    1 Not at all annoyed

    2 Slightly annoyed

    3 Moderately annoyed

    4 Very annoyed

    5 Extremely annoyed

[INTERVIEWER SAY: "Question 13 is for those of you who either saw or heard an aircraft. If you did not see or hear any aircraft, please wait until I get to question 14."]

13. To the best of your knowledge, were the aircraft that you saw or heard today at *(NAME OF SITE)* primarily: *(CIRCLE ONE NUMBER)*

    1 Commercial aircraft flying passengers from one airport to another

    2 Military aircraft on training flights

    3 Sightseeing aircraft showing visitors the sights from the air

    4 General aviation or privately owned planes

[INTERVIEWER SAY: "Now I would like everyone to answer Question 14."]

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14. Do you remember seeing or hearing any information about aircraft that might fly over *(NAME OF SITE)* today? *(CIRCLE ONE NUMBER)*

1 No ------------> 14b. *IF INFORMATION TREATMENT GROUP, ASK:* Did you notice a sign at the trail head today telling you about aircraft you might hear or see while on the trail?

1 No
2 Yes ------------>14c. Did you read the sign?

1 No
2 Yes

2 Yes ------------> 14d. What was it that you saw or heard about aircraft?

1 Sign at trail head
2 Other *(specify)*

____

____

15. Is there anything else you would like to tell us about your visit to *(NAME OF SITE)? (FILL IN BLANK)*

____

____

*[**INTERVIEWER:** INSTRUCT RESPONDENT TO COMPLETE THE BACKGROUND INFORMATION REQUESTED ON THE LAST PAGE OF THE ANSWER SHEET.]*

THANK YOU FOR YOUR HELP!

ATTACHMENT 1
APPENDIX B
Visitor Intercept Survey
Answer Sheet

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VISITOR QUESTIONNAIRE ANSWER SHEET

Your participation in the survey is voluntary. There are no penalties for not answering some or all of the questions, but since each interviewed person will represent many others who will not be surveyed, your cooperation is extremely important. The answers you provide are confidential. Our results will be summarized so that the answers you provide cannot be associated with you or anyone in your group or household.

Question 1 *(FILL IN BLANK)*

Date: Month ______________________ Date __________

Time: ____ ____ : ____ ____ a.m. / p.m.

Question 2 *(CIRCLE ONE NUMBER)*

1 **First visit**

2 **Visited park before -----------> Approximately _________ total times**

Question 3 *(CIRCLE ONE NUMBER)*

1 **No**

2 **Yes-----------> ________ Total number of visits in past 5 years**

Question 4 *(CIRCLE ONE NUMBER)*

1 **Not at all enjoyable**

2 **Slightly enjoyable**

3 **Moderately enjoyable**

4 **Very enjoyable**

5 **Extremely enjoyable**

Public reporting burden for this collection of information is estimated to average 10 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspects of this collection of information, including suggestions for reducing the burden, to Department of Defense, Washington Headquarters Services, Directorate for Information Operations and Reports (0701-0143), 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number, OMB Approval 0701-0143, Expiration 6/30/2000.

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Question 5 *(FILL IN BLANK)*

____

____

____

Question 6 *(FILL IN BLANK)*

____

____

____

Question 7 *(CIRCLE ONE NUMBER FOR EACH REASON)*

Would you say that. . .	**Not at All Important**	**Slightly Important**	**Moderately Important**	**Very Important**	**Extremely Important**
Reason 1	1	2	3	4	5
Reason 2	1	2	3	4	5
Reason 3	1	2	3	4	5

Question 8 *(CIRCLE ONE NUMBER)*

1 No

2 Yes

Question 9 *(CIRCLE ONE NUMBER)*

1 Not at all annoyed

2 Slightly annoyed

3 Moderately annoyed

4 Very annoyed

5 Extremely annoyed

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Question 10 *(CIRCLE ONE NUMBER FOR EACH STATEMENT)*

Sounds from aircraft interfered with your. . .	**Not at All**	**Slightly**	**Moderately**	**Very Much**	**Extremely**
Statement 1	1	2	3	4	5
Statement 2	1	2	3	4	5
Statement 3	1	2	3	4	5

Question 11 *(CIRCLE ONE NUMBER)*

1 **No**
2 **Yes**

Question 12 *(CIRCLE ONE NUMBER)*

1 **Not at all annoyed**
2 **Slightly annoyed**
3 **Moderately annoyed**
4 **Very annoyed**
5 **Extremely annoyed**

Question 13 *(CIRCLE ONE NUMBER)*

1 **Commercial aircraft flying passengers from one airport to another**
2 **Military aircraft on training flights**
3 **Sightseeing aircraft showing visitors the sights from the air**
4 **General aviation or privately owned planes**

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Question 14 *(CIRCLE ONE NUMBER)*

1 **No**

2 **Yes** (*SKIP TO QUESTION 14d*)

Question 14b *(CIRCLE ONE NUMBER)*

1 **No** *(SKIP TO QUESTION 15)*

2 **Yes**

Question 14c *(CIRCLE ONE NUMBER)*

1 **No** *(SKIP TO QUESTION 15)*

2 **Yes** *(SKIP TO QUESTION 15)*

Question 14d *(CIRCLE ONE NUMBER)*

1 **Sign at trail head**

2 **Other** (*PLEASE SPECIFY*)

____

____

____

Question 15 *(FILL IN BLANK)*

____

____

____

PLEASE COMPLETE THE FOLLOWING BACKGROUND INFORMATION:

Sex: ____ Male ____ Female

What year were you born? 19_____

State of Residence: ________________

Zip Code: ___________

THANK YOU FOR YOUR HELP!

ATTACHMENT 1
APPENDIX C
Observation Form

Observation Form

(Date:____________________)

Group Number	Group Arrival Time	Number in Group	Group Description	Group Departure Time	Sign Treatment (Up/Down)

ATTACHMENT 1
APPENDIX D
Visitor Group Cover Sheet

VISITOR QUESTIONNAIRE COVER SHEET
PARK/SITE INFORMATION

Park Name: (White Sands National Monument)
Park Code: (7810)
Type of Park: 1 Natural 2 Cultural 3 Other
Site Name: (Big Dune Trail)
Type of Site: 1 Frontcountry 2 Backcountry
Month/Day: ____________________
Field Staff Code: ___ ___ ___

TIME INFORMATION

Observed Time:
Arrived at Site: ___ ___ : ___ ___ a.m. / p.m.
Interview Began: ___ ___ : ___ ___ a.m. / p.m.
Time at Site: ___ ___ Hours ; ___ ___ Minutes
Self-Reported Time:
Arrived at Site: ___ ___ : ___ ___ a.m. / p.m.
Time at Site: ___ ___ Hours ; ___ ___ Minutes

GROUP INFORMATION

Group #: ___ ___

Type of Transportation:
1 Private car/van
2 Tour bus/van
3 Foot
4 Bike/unicycle
5 Horse
6 Motorcycle/ATV
7 Other: ____________

Observed Activity: ____________________

Number of People in Group:
________ Adults
________ Children (under 16 years of age)
________ Total

Sign Treatment: 1 Sign Up 2 Sign Down

[NOTE: INTERVIEWER COMPLETES THIS COVER SHEET AND ATTACHES IT TO THE COMPLETED ANSWER SHEETS FOR EACH GROUP.]

ATTACHMENT 1
APPENDIX E
Summary of Visitation

DOD/USAF Military Aircraft Overflight Study

Dose-Response Visitor Information Sheet

Daily Start and End Times					Number of Ineligible Groups that					Number of Eligible Groups that				
Date	Interview Data Collection Start Time	Interview Data Collection End Time	Time Sign Up	Time Sign Down	Stayed in Car, Never Entered Site, or Came at End of Day	Were Not at Site Long Enough	Were Not a U.S. Citizen	Were Previously Interviewed	TOTAL INELIGIBLE GROUPS	At Least one Person in Group Completed a Survey	Everyone in Group Refused Survey	Were Missed	Had a Language Barrier	TOTAL ELIGIBLE GROUPS
M, 7/14/97	10:15	16:10	12:03	16:10	7	13	10		30	17	1			18
T, 7/15/97	8:52	15:08	8:52	11:40	22	8	8		38	15	1			16
W, 7/16/97	8:10	14:36	10:20	14:36	27	5	6		38	13				13
R, 7/17/97	8:07	15:24	10:13	12:55	23	9	6		38	20		1		21
F, 7/18/97	8:09	14:50	10:37	13:08	23	6	9		38	17	1			18
M, 7/21/97	8:08	15:20	8:54	12:04	25	6	5		36	25	1			26
T, 7/22/97	8:05	14:46	10:03	13:15	18	7	8		33	22	2			24
W, 7/23/97	10:29 (Missile Test)	15:42	11:54	13:53	29	9	7		45	16	1			17
R, 7/24/97	7:54	1:19 (Rain)	7:54	11:47	14	2	7	1	24	21			1	22
F, 7/25/97	8:41	14:35	na	na	22	10	9		41	18	1			19
TOTAL					210	75	75	1	361	184	8	1	1	194

The sign said: "Military aircraft can regularly be seen and heard on this walk." Data collection did not begin until the noise measurements were in place.

Summary:
- 351 of 381 completed surveys received a dose.
- 179 of 381 (47%) completed surveys had the sign up.
- 170 of 351 (48%) completed surveys with a dose had the sign up.

DOD/USAF Military Aircraft Overflight Study

Dose-Response Visitor Information Sheet

	Number of Adults in Eligible Groups that									
Date	Completed Interview with Dose (SIGN UP)	Completed Interview with Dose (SIGN DOWN)	Completed Interview without Dose (SIGN UP)	Completed Interview without Dose (SIGN DOWN)	Refused Interview	Were Missed	Stayed in Car or Never Entered Site	Language Barrier	Not U.S. Citizen	TOTAL ADULTS IN ELIGIBLE GROUPS
M, 7/14/97	5	18	3	9	2					37
T, 7/15/97	25	5			4		1			35
W, 7/16/97	10	19								29
R, 7/17/97	16	25			3	1	1			46
F, 7/18/97	3	18	6	2	3				1	33
M, 7/21/97	31	17		2	6				2	58
T, 7/22/97	37	16			6		2	1		62
W, 7/23/97	11	22			3	1	1		1	39
R, 7/24/97	30	9		5				2		46
F, 7/25/97	0	33		3	3	1		1		41
TOTAL	168	182	9	21	30	3	5	4	4	426